

# Coal Age

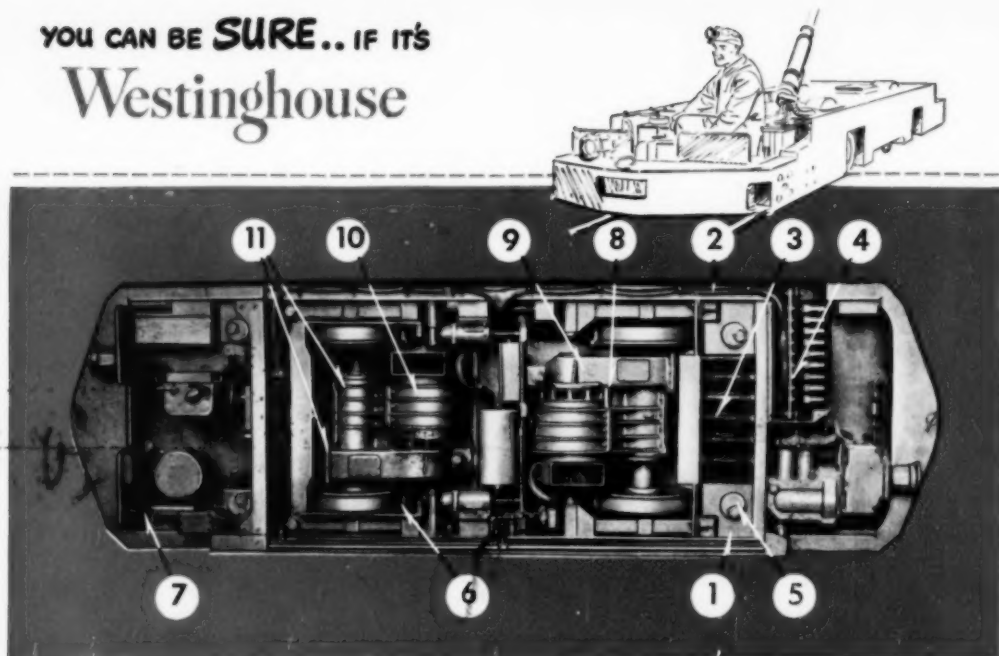
IRON-ORE PRACTICES

DECEMBER, 1949



**MINING MACHINES ABROAD... p 70**

YOU CAN BE **SURE**.. IF IT'S  
**Westinghouse**



## **Low Liner construction** **means More Low Coal!**

26" over-all height means access to low veins . . . fast, economical movement of low coal when you use the Westinghouse *Low Liner*. Compact design, efficient operation and simplified maintenance are provided by these carefully planned construction features:

1. Piping laid in trough on top of side frame with free access to every union, cock and joint.
2. Wiring enclosed in hose—placed in trough of other side frame.
3. Resistor mounted in one accessible frame—reducing wiring to a minimum.
4. Pneumatic contactors mounted adjacent to, but well protected from resistor.
5. Sandboxes with capacity normally found on higher locomotives.
6. Solid brake pull rods—instead of chains.
7. Side frames and bumpers are held together by tapered, reamed, driven-through bolts.
8. Motor and drive unit mounted in same gear casting.

9. Gearing of spur design—shafts mounted parallel to motor armature shaft.

10. No external couplings or drive parts. All wearing parts internally mounted and continuously lubricated.

11. Complete motor and gear assembly easily removed in same manner as axle-hung motor.

12. All equipment on locomotives accessible without moving adjacent parts.

Service and parts are as near as your telephone. For complete details, consult your Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-15148

**Westinghouse**  
**MINE LOCOMOTIVES**







## They cut down a hill with water

*A typical example of B.F. Goodrich product improvement*

**T**HERE'S a hose carrying such a powerful stream of water it takes five men to handle it. Hills above new dams or bridges are cut down by water pressure, sweeping away dirt and loose rocks. But contractors needed hose that could stand the pressure and be safe.

Some of it has to stand a total force of 3,000 pounds pressure in each inch of hose length (compared to 50 or 100 pounds in your garden hose). That means, in one foot of hose, a total pressure of nearly 18 tons. A sudden kink or other stoppage, a burst at a weak spot, and the result might be serious injury to workmen. B. F.

Goodrich men developed a hose without weak spots.

Many people think of hose as just something to carry water. B.F. Goodrich hose is a whole set of tools for industry. In an ordinary year we make over 7,000 kinds, types and sizes. There are fifty or more types and sizes for handling water alone.

Some have to stand hot water as well as cold; some have special compounds to stand salt water, acid water, other chemicals or sharp particles. Some have rubber-sealed ends to protect cord reinforcements. Some have to stand extra wear outside—drag-

ging over cinder yards or concrete. Some have to stand oil or grease. All have had dozens of improvements in recent years.

If you use hose, don't be satisfied without finding out what special kinds B.F. Goodrich may have for your type of work—and what B.F. Goodrich has done recently to improve them. It's a safe bet that some one of these 7,000 kinds of hose can save you money. Just ask your B.F. Goodrich distributor. The B.F. Goodrich Co., Industrial and General Products Div., Akron, Ohio.

**B.F. Goodrich**  
RUBBER FOR INDUSTRY



Here's what takes the devilry out of Friction Devils — those big blue drums of Hulburt Quality Grease! For when this Grease comes into your mine and goes to work in your machinery there's no peace for those demons of ill-will; and they get out to stay out; and wear and trouble take a year-round holiday.

**HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.**

*Specialists in Coal Mine Lubrication*

# "MERRY CHRISTMAS" for FRICTION DEVILS !



## Hulburt *Quality* GREASE

was developed as a special lubricant for all coal mining machinery—for that service and nothing else. That is why it does its job best, and at the lowest possible cost. Hulburt Engineering Service is ready to serve you on the regular HULBURT plan—whereby you, the mine operator, are sole judge of results obtained. Years of experience prove how well you will be satisfied!

IN A CLASS BY ITSELF

for **4** good reasons

## New HAZACORD MINING DRILL CORD

### \*ZBF ZINC BORATE FORMULA

Flame tests have shown that Zinc Borate imparts greatly increased fire-resistant properties to neoprene compounds with burning rates reduced by as much as 20% and weight losses by as much as 40%. Afterglow is materially reduced also. Millions of feet of cable protected by this type of sheath were used during the war by the Navy for special operating conditions to gain extra fire protection. Hazaprene ZBF Sheaths mean not only greater safety because of unusual flame-resistance and lack of afterglow — but also longer life through increased resistance to abrasion, wear and tear.



FOR TIME-SAVING, COST-SAVING  
CONTROL CIRCUITS WITHOUT CONDUIT,  
the thick, reinforced Hazaprene ZBF Sheath  
of this new cord assures ample protection.

**SAFETY:** This new drill cord is protected with an extra thickness of Hazaprene ZBF\* Sheath providing flame-resistance to a degree never before attained in mining cable. And when you add these facts: that neoprene treated, glass-cord strength members are used . . . that Okobestoprene Tape (made of asbestos fibres and neoprene) wraps the interior cable assembly — you see why Hazacord Special Mine Drill Cord is by far the *safest* you can purchase.

**DURABILITY:** In addition to the high flame-resistance gained, more protection against mechanical damage is also provided by the extra thickness and the unusual toughness of this *mold-cured* Hazaprene ZBF Sheath, absorbing without damage heavy blows from mining equipment, lumps of coal or rock. Its abrasion-resistance and high tensile strength successfully withstand sharp edges, dragging and pulling. The neoprene

sheath is unaffected by moisture, oil, acids, sunlight. The glass-cord fillers add to Hazacord's pulling strength . . . prevent moisture-absorption through cable ends. You'll get *more trouble-free service* from this cord than you ever thought possible.

**FLEXIBILITY:** Along with its toughness and safety features, you'll find Hazacord Special Drill Cord has extreme flexibility to assure good working qualities.

**MEETS OFFICIAL REQUIREMENTS:** Hazacord Mining Drill Cord more than meets the flame-test requirements of the State of Pennsylvania and U. S. Bureau of Mines and is so certified by App. No. P-104 BM molded in the sheath at frequent intervals.

It will pay you to get full information about the new Hazacord Mining Drill Cord today. Ask your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

# HAZARD

insulated wires and cables for every mining use

7637

# Coal Age

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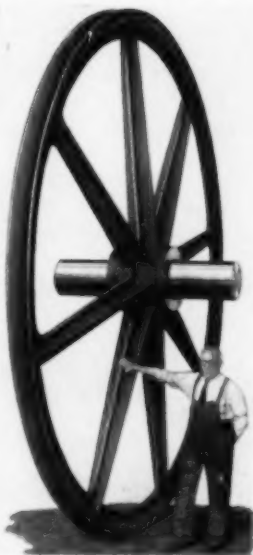
## THESE VULCAN ALLCASTEEL SHEAVES Still Show No Visible Wear

After more than twenty years of continuous service at a well-known anthracite shaft, noted for fast hoisting, the four Vulcan Allcasteel Sheaves shown above still show no visible wear and have never required any attention beyond periodic inspection and lubrication. So satisfactory has been their service, in fact, that all other shafts operated by this large company are now similarly equipped.

Besides being light and very strong, Vulcan Allcasteel Sheaves are so highly resistant to rope wear that **NO LINERS ARE NEEDED**. The groove maintains its original correct shape indefinitely—thereby eliminating the destructive grinding and pinching of wire rope so often caused by soft, easily worn, sheaves and greatly prolonging its useful life.

Mining men are conservative and acceptance of Vulcan Allcasteel Sheaves came slowly at first but has gained momentum so rapidly that our list of "Repeat" users now includes a large percentage of the leading companies in both the coal and metal-mining fields. Available in any size, with either plain or anti-friction bearings, they have thoroughly established their money-saving superiority for every type of heavy-duty service.

Bulletin A-396, twenty fully-illustrated pages, gives complete information. Write for a free copy and tell us about any present or prospective sheave-wheel requirement.



One of seven 14-ft. dia. Allcasteel Sheaves furnished to a well-known metal-mining company.

# Vulcan Iron Works

Established 1849 **WILKES-BARRE, PA., U.S.A.** Cable Address "Vulworks Wilkes-Barre"

Other Vulcan products for the mining industry include all types and sizes of Electric Hoists, Cages and Skips, Shaking-Chute Conveyors, Chain Conveyors and Electric Locomotives for Underground Haulage. Bulletins mailed on request.

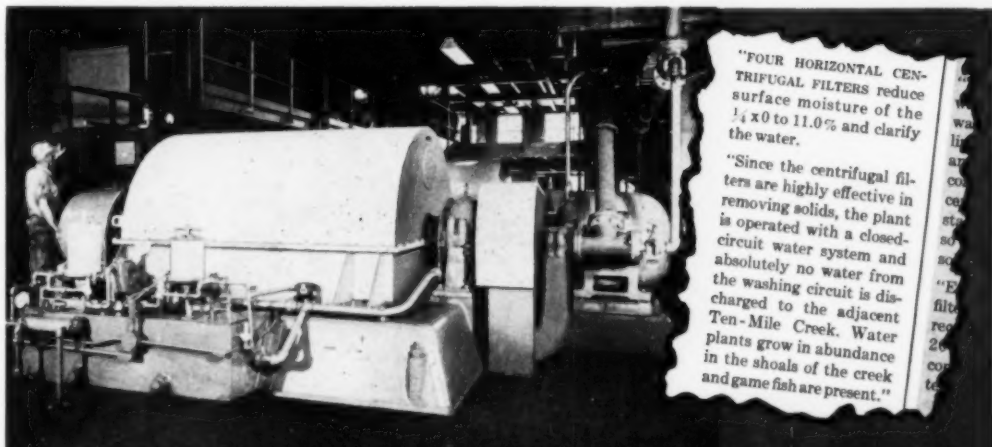


WHAT

*Coal Age*

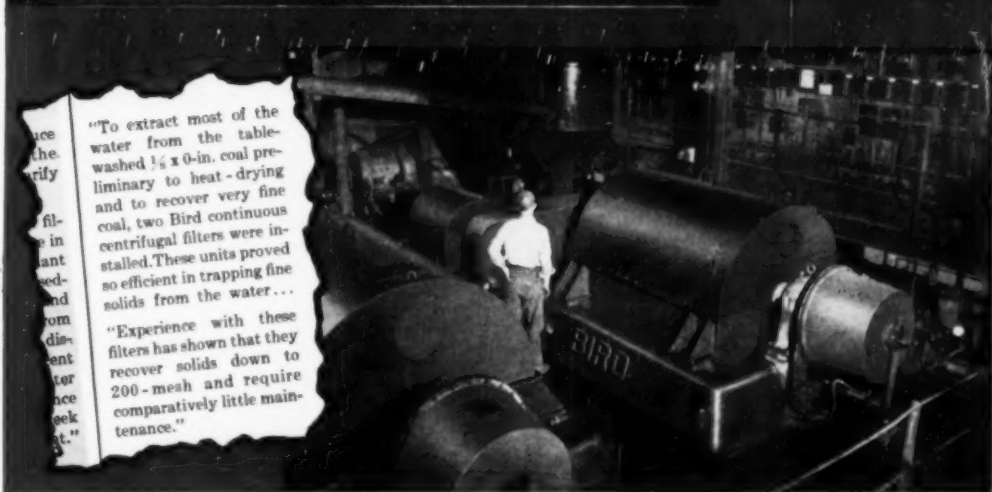
SAYS ABOUT THESE

BIRD COAL FILTER Installations



"FOUR HORIZONTAL CENTRIFUGAL FILTERS reduce surface moisture of the  $\frac{1}{4}$  x 0 to 11.0% and clarify the water.

"Since the centrifugal filters are highly effective in removing solids, the plant is operated with a closed-circuit water system and absolutely no water from the washing circuit is discharged to the adjacent Ten-Mile Creek. Water plants grow in abundance in the shoals of the creek and game fish are present."



"To extract most of the water from the table-washed  $\frac{1}{4}$  x 0-in. coal preliminary to heat-drying and to recover very fine coal, two Bird continuous centrifugal filters were installed. These units proved so efficient in trapping fine solids from the water...

"Experience with these filters has shown that they recover solids down to 200-mesh and require comparatively little maintenance."

WRITE FOR THIS BULLETIN for the whole story on the BIRD COAL FILTER and what it can do to save coal and money for you.

BIRD MACHINE COMPANY - South Walpole, Mass.



The BIRD

Continuous Centrifugal  
COAL FILTER



## ...permits **HEAVIER IMPACT**

● Because of its patented Anti-Short Breaker Strip (available with or without ground wire) between conductors, Securityflex Parallel Mine Cable can withstand severe impacts with minimum danger of shorting. Adhesion between jacket and insulation—that makes a *solid block* around conductors—helps to give Securityflex its amazing crush-resistance. (Points that mean *greater safety* and *more tons per cable*.)

Other points of interest in Securityflex . . . neoprene jacket protects against flame, abrasion and tearing . . . engineered construction prevents kinking or twisting and stands up longer under extreme overloads . . . cable meets U. S. Bureau of Mines Flame Test and diameter specifications and Pennsylvania Flame Test.\*

Specify Securityflex through your Anaconda distributor (all principal cities). Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.



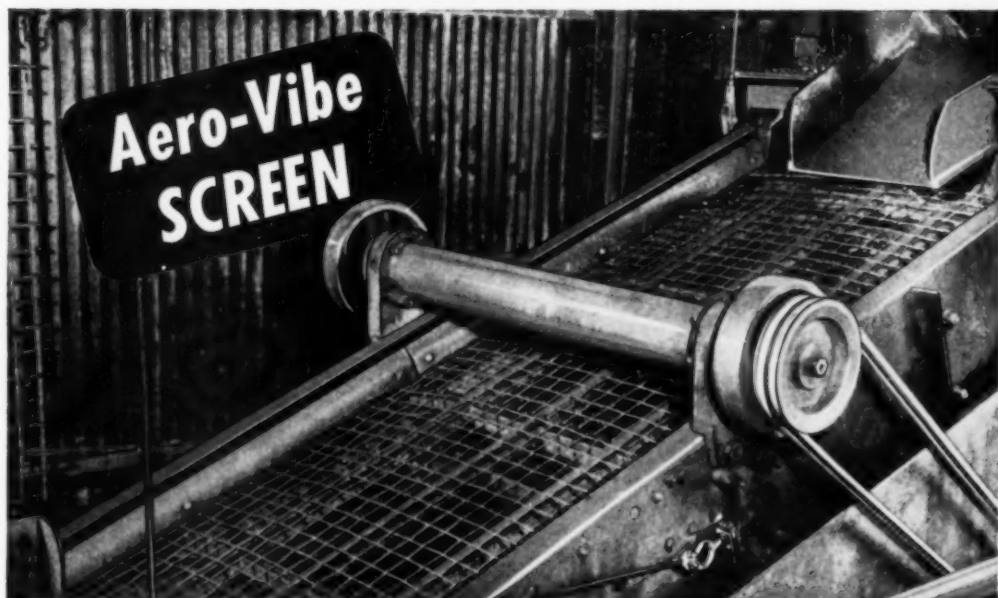
\*Insist on mark of full compliance—P-102-BM—at 18" intervals on any mine cable you buy.

**ANACONDA**

*Securityflex*

**MINE CABLE**





## After 10 Years, Still "Low on Maintenance, High on Sizing Efficiency!"

MORE THAN 10 YEARS AGO this processor installed the 5x10 ft double deck *Aero-Vibe* screen shown above. Today this Allis-Chalmers vibrating screen is still going strong... still producing 100 tons per hour of graded 3 x 1½ and 2 x 1½-inch products—and working two shifts every day.

Operators say, "maintenance has been very low...sizing efficiency very good." And that's typical of owner reports wherever this economical, low-cost vibrating screen has been installed.

*Aero-Vibe* screen utilizes the most simple of vibrating mechanisms, a two-bearing concentric shaft with off-center weights. Amplitude of vibration can be changed easily by adjusting outer counterweights on each side.

### CHECK AERO-VIBE SCREEN FEATURES

►Designed for small tonnages . . . or

*Aero-Vibe, Ripl-Flo, Low-Head* are Allis-Chalmers trademarks.

for auxiliary sizing service.

►Handles up to 3-inch feed size.

►Makes separations from 20-mesh to 1½ or 1¼-inches square.

There is an Allis-Chalmers representative near you who will gladly look over your operations and tell you just where *Aero-Vibe* screens may help you save money and speed production. Call him today, or write for Bulletin 07B6099.

*Aero-Vibe* is one of a complete line of vibrating screens built by Allis-Chalmers. Others include the *Low-Head* horizontally operating screen and the *Ripl-Flo* inclined deck sizing screen. Both are widely used in rock and ore preparation. A-C offices or distributors in principal cities in the U.S.A. and throughout the world.

A-2816

ALLIS-CHALMERS, 968A SO. 70 ST.  
MILWAUKEE, WIS.



AND OTHER EQUIPMENT  
FOR THE CRUSHING, CEMENT  
AND MINING INDUSTRIES

# ALLIS-CHALMERS

# Keep Hydraulic Pumps

## USE Texaco Regal Oils (R&O)

Make pumps and other parts of hydraulic systems last longer and work more smoothly by charging the systems with *Texaco Regal Oils (R & O)*. These world-famous, turbine-grade oils keep your hydraulic mechanisms operating at top speed and efficiency.

*Texaco Regal Oils (R & O)* are fully resistant to rust and oxidation, and are specially processed to prevent foaming. They keep hydraulic systems clean . . . protect pumps and valves against wear and fouling . . . assure smooth, responsive hydraulic action for longer periods of time.

There are suitable viscosities of *Texaco Regal Oils (R & O)* for every size and type of hydraulic mechanism. No "cutting back" is required. These quality oils are recommended by leading builders of hydraulic equipment, and many ship their units charged with them.

Let a Texaco Lubrication Engineer help you improve the operating efficiency of all your machinery. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, *National Sales Division*, Dept. C, 135 East 42nd Street, New York 17, N. Y.

TEXACO STAR THEATRE  
presents MILTON BERLE  
on television  
every Tuesday night.  
METROPOLITAN OPERA  
broadcasts every  
Saturday afternoon.



# TEXACO LUBRICANTS

# Clean

## LIKE THIS

### EASIER COLD WEATHER STARTS

—Lubricate car wheel bearings of all types with Texaco Olympian Grease. It assures easier starts even in winter weather . . . resists oxidation, separation and leakage . . . gives longer lasting protection.



Note cleanliness of this part taken from a hydraulic pump. System charged with Texaco Regal Oil (R & O).



Straight mineral oil was used in the hydraulic system from which this pump part was removed. Damage from rust and sludge resulted.

# For the Coal Mining Industry

# Tigerweld Bonds keep power flowing

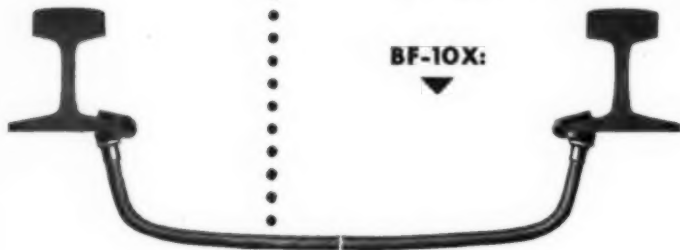
These sturdy, U-S-S Tigerweld Rail Bonds have proved their superiority on hundreds of miles of heavily-traveled, electrified mine track. They maintain constant voltage, reduce power loss.



**Wedge-Type:** The American Wedge-Type Bond is primarily designed for quick installation on tracks that may have to be moved, but this durable bond holds so well that many mines use it for permanent installation. It can be installed in a few minutes with a high speed drill and a 3-pound hammer. In spite of its ease of installation, the wedge-type bond holds with a grip that won't shake loose. But if you want to remove the bond from temporary trackage, you can hammer it out as easily as you put it in.



**BF-10:** The BF-10 Power Bond is designed for quick permanent installation by welding. Just drive it on to the base of the rail and it stays in position ready to weld. No special clamp is necessary. Your maintenance crews can install more bonds per day at lower cost. And once the BF-10 Bonds are installed they're on to stay!



**BF-10X:**

The BF-10X is a cross bond with self clamping terminals to make installation easy. The terminals can be secured to the rails by a few taps of a hammer. And they stay firmly in place while the steel-to-steel weld is applied. The BF-10X Bond has great resistance to fatigue stresses. It can be reclaimed and used again and again.

All of these bonds are butt-welded. That means that in every case all the wires are electrically connected—permanently—to the solid end piece. Butt-welding will consistently develop almost full strength of the strand on a tensile test to destruction. So always specify Tigerweld Bonds. They're *all* butt-welded!

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO  
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS  
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



## American Tigerweld Rail Bonds

UNITED STATES STEEL



# AGED AT 250°F



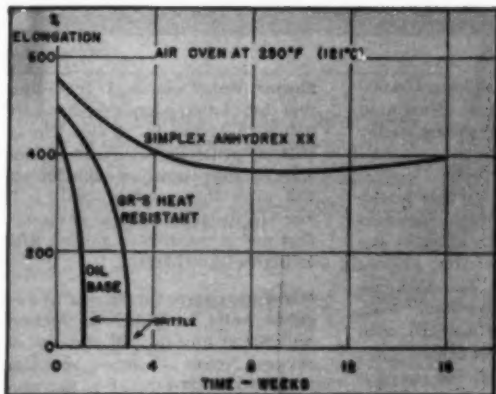
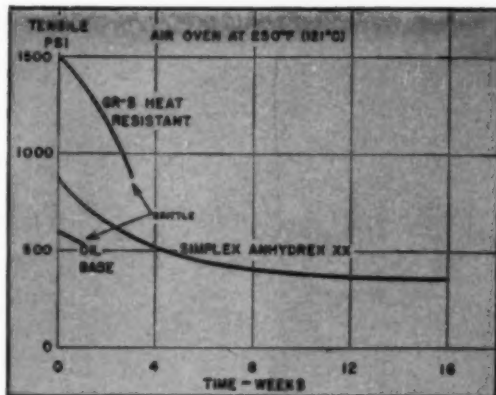
## ... YET THE NEW ANHYDREX XX PROVES ITSELF "TOPS" AMONG HIGH-VOLTAGE INSULATIONS!

Yes, at 250 F., and after SIXTEEN weeks of constant exposure to this grueling temperature the new Anhydrex XX insulation was still rubber-like in quality and appearance; still suitable for continued use. It had retained approximately half of its tensile strength, nearly two-thirds its elongation. And after the first few weeks the rate of deterioration was very slight, indicating exceptional stability and long life.

Conventional oil base and GR-S heat-resistant compounds undergoing the same test could not match its performance. At the end of only one week the oil base compound had completely lost its rubber-like characteristics. Two weeks later the GR-S compound followed suit. Both had become brittle and, upon bending, immediately cracked and crumbled.

After aging for 7 days under the same high temperature, Anhydrex XX was immersed for a week in distilled water at 70 C. (158 F.) yet would not absorb more than 15 mg. per square inch of exposed surface. It was exposed to .03% ozone for four hours yet would not crack when bent.

Yes, Anhydrex XX is the only high-voltage insulation that combines low water absorption with long life, ozone resistance and heat resistance. It is your assurance of low-cost, uninterrupted service under all operating conditions. For complete data, write us today for Specification 1685.



# SIMPLEX WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

3,167 FT.

# This tops them all!

## Huge coal slope belt is newest engineering wonder

100 TONS OF COAL RIDE ON BELT  
AT ALL TIMES

862 FT.  
HIGH

LEANING TOWER  
OF PISA—180 FEET

STATUE OF  
LIBERTY—306 FEET

The monumental structures shown above—each the tallest of its kind—are all eclipsed in height by the newest single-flight slope belt engineered by the G.T.M.—Goodyear Technical Man. It is the highest and longest single-flight slope conveyor in mining history! This new belt, to be installed in an Illinois mine, has a monumental lift of 862 feet—18% higher than the present world's record belt—another Goodyear installation. And the horizontal distance from head pulley to tail is 3,167 feet—making it the longest slope flight yet.

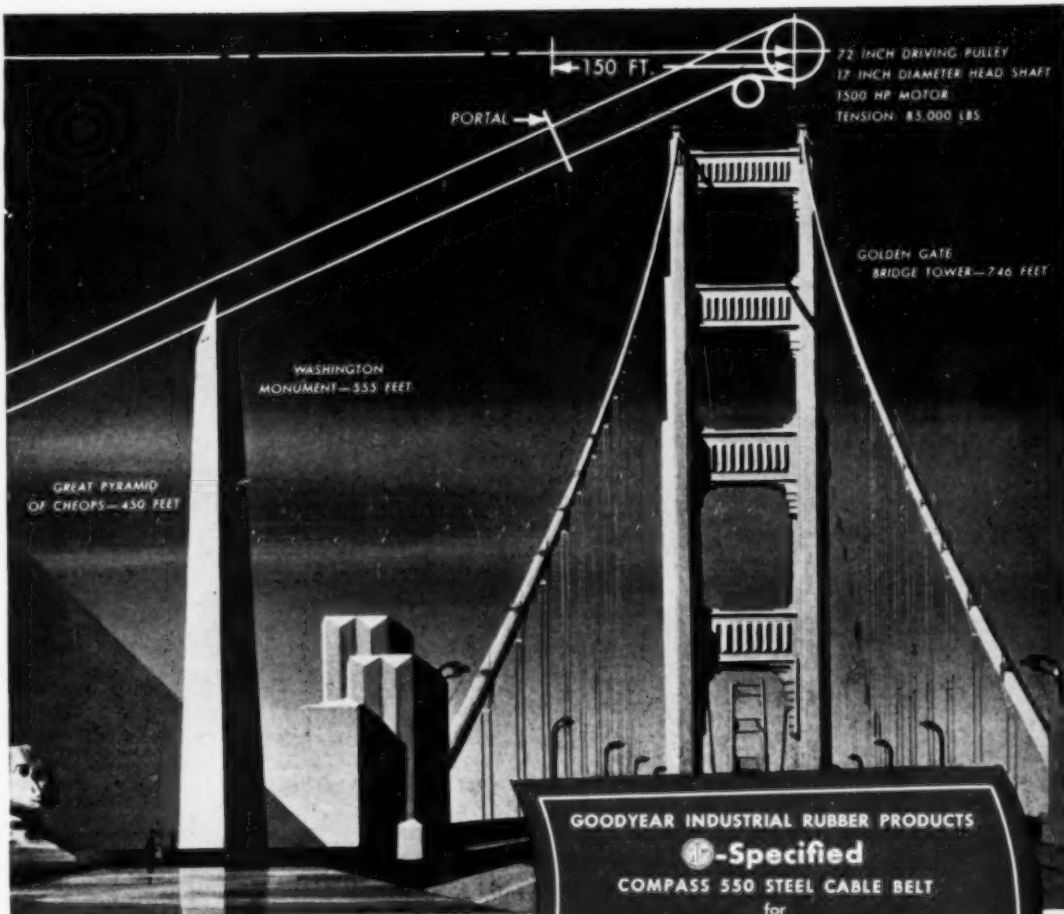
This record-breaking belt will meet these requirements: deliver 1,200 tons of coal per hour at the tippie—carry 20 tons per minute. It takes 6,800 feet of belting, 42

inches wide and weighing 174,000 pounds, to do the job. Maximum belt tension at the driving pulley is 85,000 pounds.

The belt assigned to this world-beating task is Goodyear's COMPASS 550 Steel Cable—specified by the G.T.M. because of its proved high-load capacity. The COMPASS construction “muscles” the load-carrying section of the belt with wiry, high-tensile steel cables. They give the belt unparalleled strength without the bulk and stiffness unavoidable in conventional plied-up construction. Moreover, the COMPASS belt construction gives it high dimensional stability that reduces stretch under severe loads over long periods to less than 1%.

**Bigger belts coming!** Including this installation, Goodyear has now belted 12 of the 14 highest lifts—striking proof of Goodyear superiority in slope-conveyor engineering. But even these records will fall. For Goodyear's COMPASS construction makes possible single-belt lifts as high as 1,500 feet.

**Mine-proved Compass steel cable belts** have already carried millions of tons of coal and ore in several years of mine service. Standard COAL-FLO—for average-distance hauls below ground—and rayon COAL-FLO—for longer distances—have been equally successful. To realize the full economies of slope-belt haulage, consult the G.T.M. first. Write Goodyear, Akron 16, Ohio.



### Why single-flight belts outperform multiple-flight conveyors

*Eliminate nuisance and hazards of transfers in the slope*

*Do away with offset slopes—material flows uninterrupted from mine level to tippie*

*Greater life-expectancy compared with short, multiple-belt flights*

**RESULT:** lower operating cost and more profitable output

Compass, Coal-Pile, T.M. - The Goodyear Tire & Rubber Company

# GOODYEAR

THE GREATEST NAME IN RUBBER



... WHISPER IT

# "LOW COST PER UNIT OF WORK"

SHOUT IT...



No matter how you say it, you're talking about Bethlehem Wire Rope

Why is Bethlehem rope the top choice among so many users? Basically, it's because it gives them their money's worth . . . gives them *low cost per unit of work*.

A unit of work varies with the industry involved. For example, it can be a cubic yard of rock moved; or a ton of coal hauled up a hillside; or a ton-mile in oil-country rotary drilling. If a wire rope accounts for a great many units of work during its lifetime, it is a good, sound buy (that's Bethlehem!). Sound because it is still in service, still producing, long after it has justified its purchase price.

When you order Bethlehem wire rope, you are getting a quality product—one that will serve you faithfully and well. On the basis of low cost per unit of work . . . the only *real* yardstick . . . it is a true bargain any day! You can buy it with confidence.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem Products are sold by Bethlehem Pacific Coast Steel Corporation  
Export Distributor: Bethlehem Steel Export Corporation



# GULF MINING MACHINE LUBRICANT B

can give you effective help in your efforts to

*increase tonnage*

*and reduce costs*



*Here's how!*

Because Gulf Mining Machine Lubricant B eliminates many of the lubrication troubles in cutting and loading machines, repair and replacement costs are sharply reduced.

Then, too, Gulf Mining Machine Lubricant B enables you to simplify your lubricant storage and handling by eliminating two or three other lubricants at the face—on most types of mining machines it can do the entire lubricating job. This means a saving in application time, prevents application errors.

Improved lubrication with Gulf Mining Machine Lubricant B also leads to fewer

breakdowns, less time in the shop—which add up to more productive time for equipment and greater tonnage.

To get the many benefits possible with this quality lubricant, and for expert help on other phases of improved lubrication, call in a Gulf Lubrication Engineer today.

**Gulf Oil Corporation • Gulf Refining Company**

Offices in Principal Cities in 30 States



GULF MAKES AVAILABLE TOP QUALITY PASSENGER AND TRUCK TIRES—ASK YOUR GULF REPRESENTATIVE



# More earth moved in less time!

Substitution of a bucket with an approximate capacity of 46 cu yds in the place of its original and smaller one has made this Hanna Coal Co. machine, at Georgetown No. 12 mine, Ohio, one of the largest in the world. It is electrically equipped throughout by General Electric. Amplidyne control has resulted in substantially increased production. Though working on a 24-hour schedule, the shovel has lost practically no time for electrical maintenance since it was first put into operation in December 1946. More than 2500 shovels and draglines have been equipped with electric drive by General Electric.



**AMPLIDYNE-CONTROLLED  
SHOVEL DRIVES**

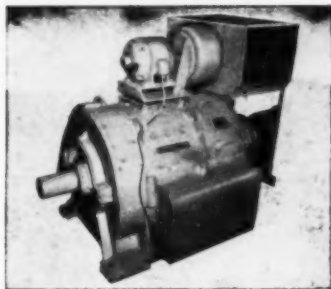
—to cut stripping  
costs per yard!





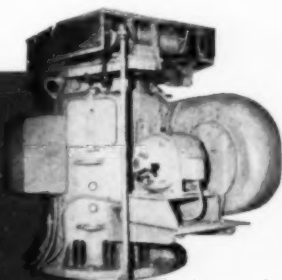


Hoist, swing, and crowd generators are driven by a G-E 1250-hp synchronous a-c motor (upper level). Shown on lower level is the power-factor amplidyne, exciter generator, and swing generator, all driven by a G-E 200-hp induction motor. The amplidyne synchronous motor field, says Mr. E. Gaston, electrical engineer of the Hanna Coal Company, maintains optimum power factor at full voltage, and reduces line losses to a minimum.



The huge bucket is raised and lowered by two G-E 425-hp MDP hoist motors, one of them shown here. Sturdy MDP motors incorporate such features as heavy steel frame to withstand severe service, dust-proof mountings for all bearings, improved banding and commutator design to permit operation at higher maximum safe speeds, and split frame to permit removal of top half for easy inspection of armature.

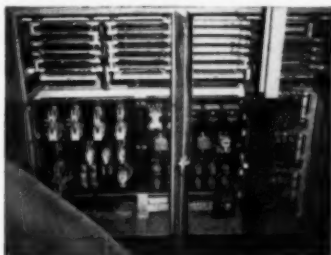
**G-E amplidyne-controlled drive on Hanna Coal Company's giant stripping shovel provides faster hoist, swing, and crowd actions, works around the clock with minimum time lost for maintenance or repairs.**



Swinging the shovel is the job of three G-E 125-hp MDV vertical swing motors (one shown at left). In addition to the main driving and control motors, some 30 auxiliary motors from 1- to 15-hp were furnished by G.E. for blowers, fans, oil pumps, steering, etc. Here an auxiliary Tri-Clad open dripproof motor drives the MDV motor's blower. Tri-Clad design and construction give three-way extra protection against physical damage, electrical breakdown, and operating wear and tear . . . proved by more than 1,500,000 Tri-Clads now in service.



Amplidyne control of hoist, swing, and crowd actions gives the operator instant shovel response. It provides faster acceleration and deceleration to cut seconds off each pass and increase daily yardage handled. The three G-E amplidyne control the three shovel motions precisely. Even at high speeds, they prevent the excessive current and torque peaks which might damage electrical and mechanical equipment.



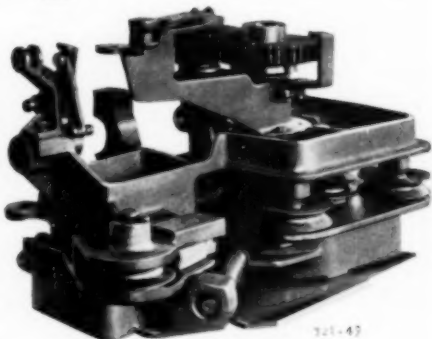
Simpler and more compact, the G-E amplidyne control panel shown uses fewer control devices, and takes up less space in crowded quarters. During the past six years, modern amplidyne control has been engineered into nearly all large shovels and draglines equipped by General Electric. For better results, make sure your shovels have G-E equipment throughout. Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

**GENERAL**  **ELECTRIC**

# SLACK HANDLING DEVICE . . .

Jeffrey 35-B or 35-BB SHORTWALL Machines can now be equipped with a Slack Handling Device, a packaged unit (right) which can be readily applied to machines in the field.

Simple to apply . . . original gearing is utilized . . . no changes necessary to top plate and rollers. Original bottom pan extension is removed . . . device bolted on. Few moving parts . . . easily accessible for maintenance.

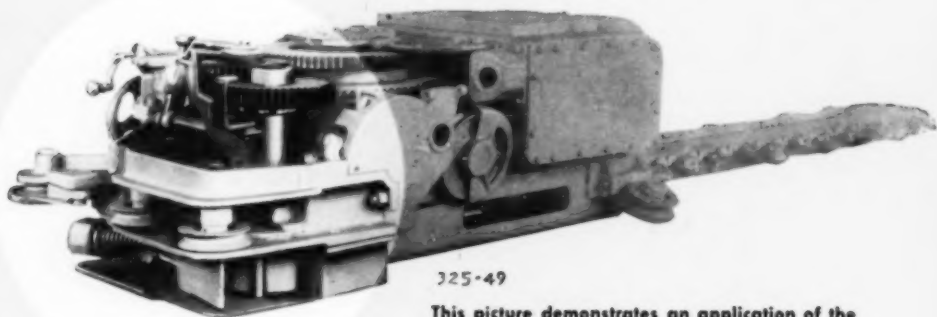


Here you see the Slack Handling Device all wrapped up in a neat package and ready to go to work for you.

70% to 85% of the cuttings removed from kerf . . . no cleaning necessary before firing shots. Cleaner kerf—less powder—better sized coal. Shoveling slack eliminated . . . slack is pushed under slack pile—not thrown. Coal dust reduced to minimum—as is explosion hazard.

Study the accompanying views . . . they show the Device as a unit, as part of the machine and doing a neat job of cleaning kerf in a mine. The drawing on next page illustrates flow of slack.

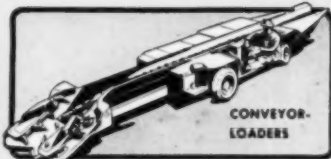
## FOR JEFFREY SHORTWALLS



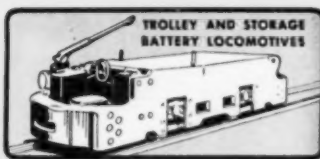
This picture demonstrates an application of the Device to the Jeffrey 35-B SHORTWALL Coal Cutter.



LOADING  
MACHINES



CONVEYOR-  
LOADERS



TROLLEY AND STORAGE  
BATTERY LOCOMOTIVES

# JEFFREY

## EQUIPMENT FOR COAL MINES

*and*

### GENUINE RENEWAL PARTS



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*Established 1877*

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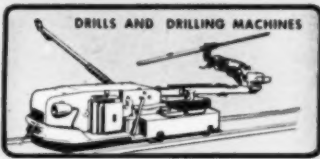
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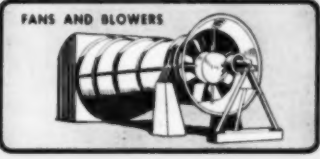
DRILLS AND DRILLING MACHINES



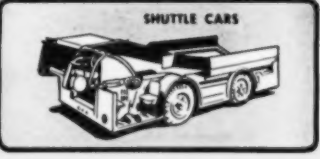
UNIVERSAL  
COAL CUTTERS



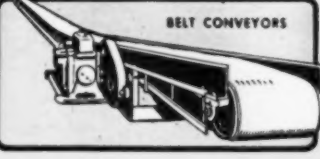
SHORTWALL COAL CUTTERS



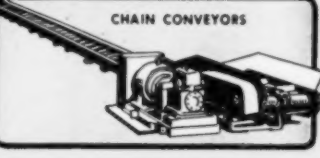
FANS AND BLOWERS



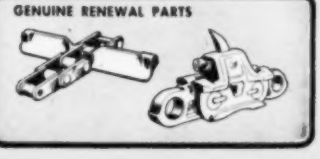
SHUTTLE CARS



BELT CONVEYORS



CHAIN CONVEYORS



GENUINE RENEWAL PARTS

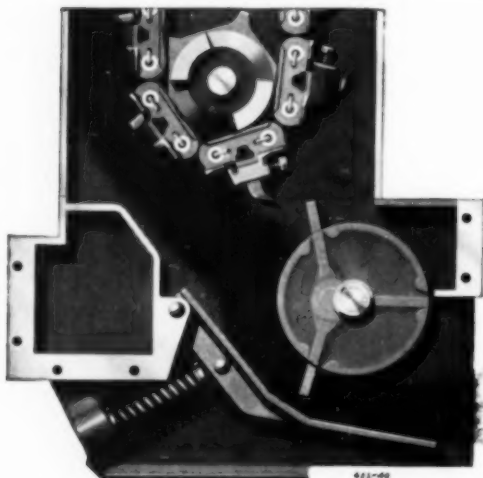


## THIS SLACK HANDLING DEVICE . . .

- Discharges slack along side of cutter away from the kerf, assuring a better fall of coal.
- Eliminates cleaning kerf by manual labor.

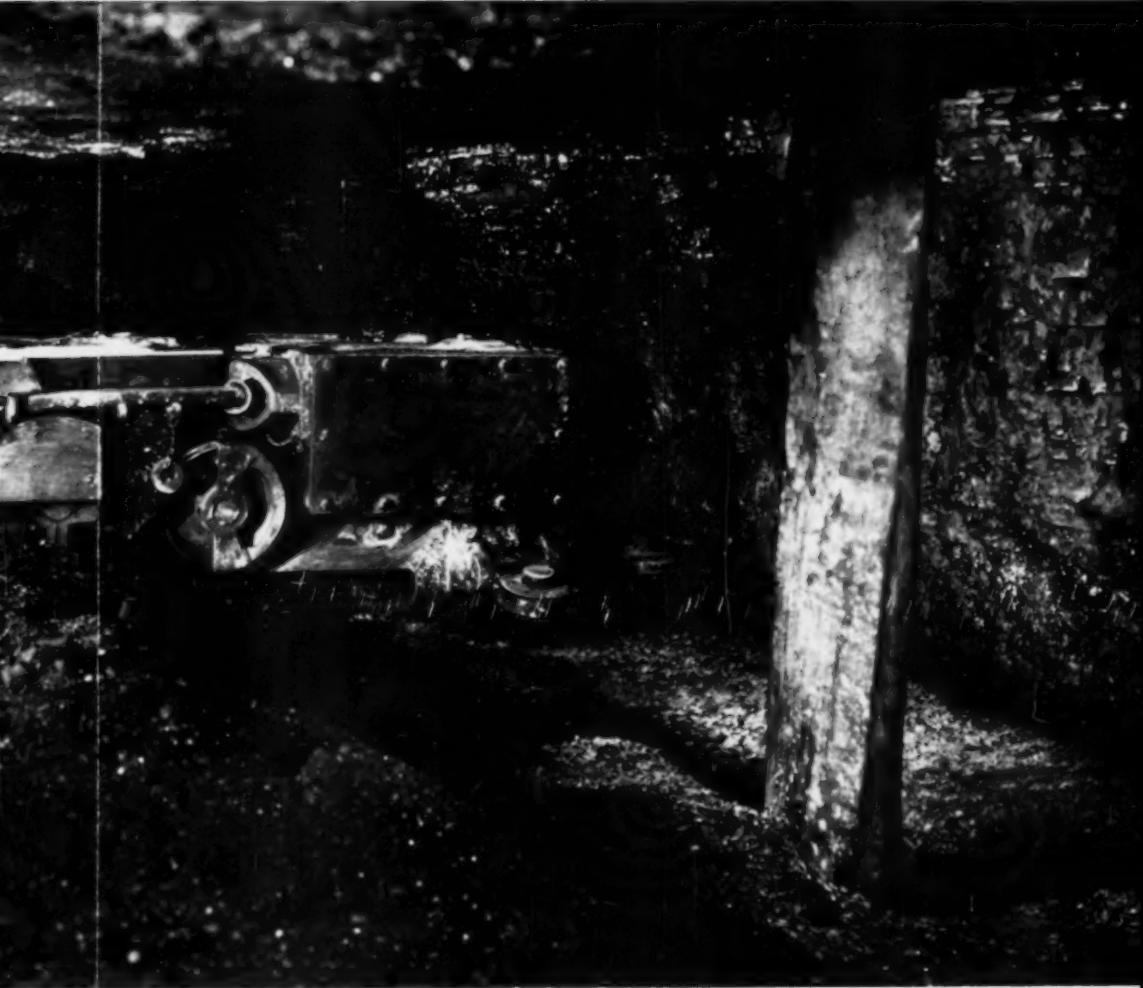
The device can be easily added to your present Jeffrey 35-B and BB SHORTWALL Machines by removing the old bed frame extension and bolting to machine. As simple as that.

A control lever is provided to disengage the drive mechanism when machine is not cutting, or is being positioned for cutting or moving. Gearing protected by shear pin.

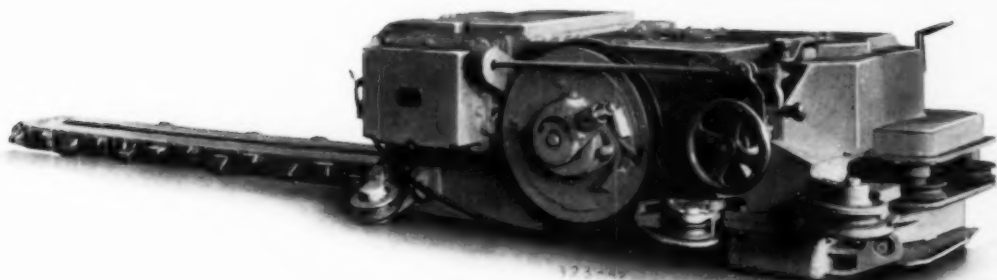


The drawing (left) gives a good idea of the principle of this NEW Slack Handling Device. Manganese steel paddles move the cuttings from the cutter chain to rear of machine. Paddles have an eccentric movement and are driven by the paddle drum.

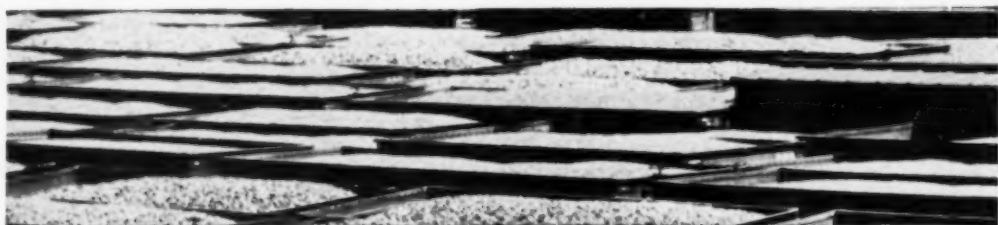
Another  
with the



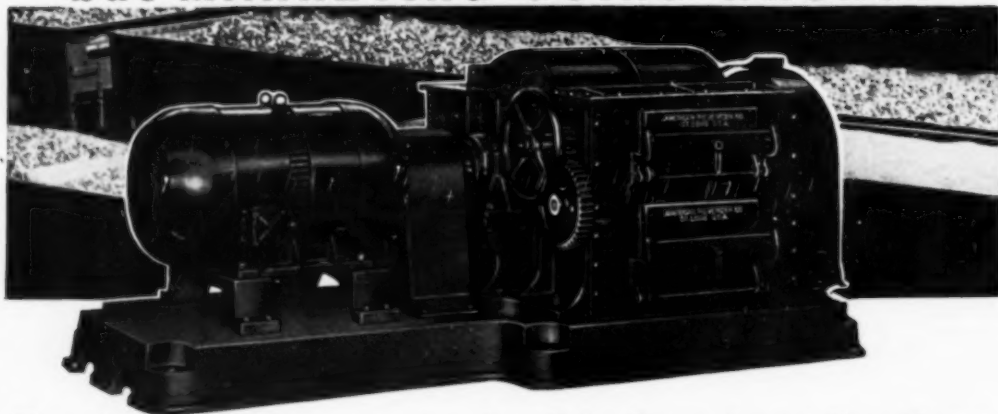
Note the clean kerf in the large illustration above.



Another view of a Jeffrey 35-B SHORTWALL  
with the Slack Handling mechanism in place.



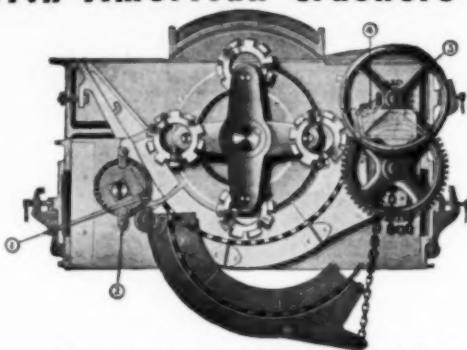
## PRODUCTION *GOING STRONG* but **MARKETING GOING WRONG?**



### *Get better size control with American Crushers*

When tonnage gains below ground are offset by improper ratios of unwanted, fines and unbalanced screen rejects, its time to survey and revise your coal crushing operation.

American Rolling Ring Crushers assure better size control with their exclusive, patented, shredder ring action. Reduction is readily controlled to obtain highly marketable or pulverizer sizes with minimum of carbon dust and with no oversize.



Only Americans have the shredder rings each with 20 cutting edges that split coal instead of crushing it. Revolving freely on its own shaft, each ring deflects from tramp iron, etc., which is propelled to metal trap.

Send for special "AC Coal Crushing Bulletin" — yours for the asking.

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*Originators and Manufacturers of  
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# 4

## STAR FEATURES OF *Whitney* UNIVERSAL MINING CHAIN

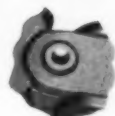
**THAT KEEP TONNAGE UP ...  
MAINTENANCE DOWN**



**Link Ports** — plates, pins, bushings and rolls — are precision made from heat-treated alloy steel stock assuring long operating life with minimum maintenance.



**Universal Joints** are constructed of steel forgings for toughness and workability. They are accurately machined for long life.



**End Pins** of the universal joints are fully riveted into deep countersink in the forgings, providing maximum anchorage under all operating conditions.



**Flight Studs** of alloy steel are fully machined and have milled threads. They are heat-treated for extreme toughness and durability.

Get the tonnage producing, cost-cutting advantages of **WHITNEY UNIVERSAL MINING CHAIN**... specify and use this outstanding chain in your loaders. Investigate, too, Whitney Power Transmission Chain, Conveyor Chain and Cut Tooth Sprockets. Write for catalog and information.

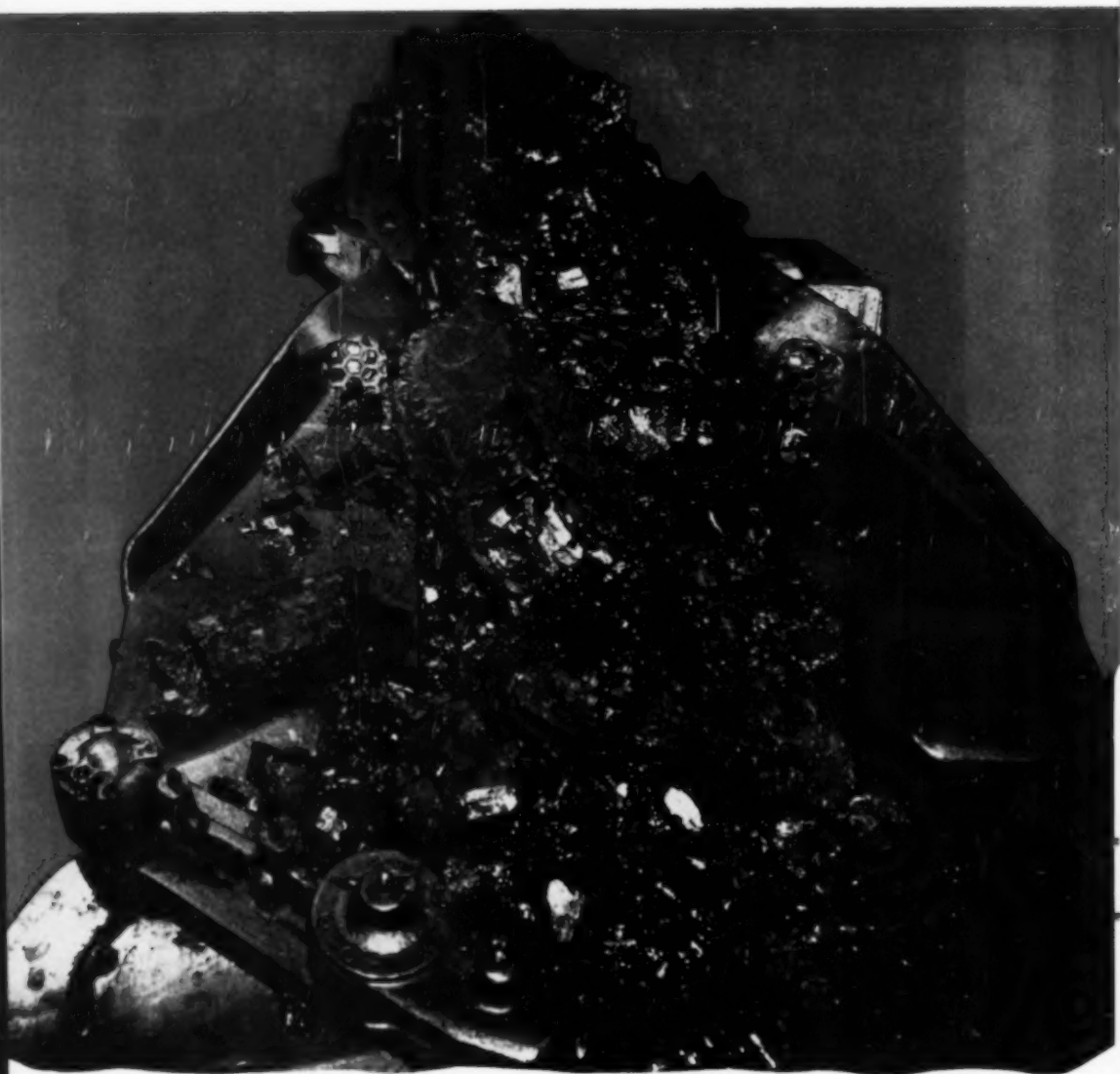
*Whitney*

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Division of Whitney-Hanson Industries Inc.

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# How to boost the output



**STANDARD OIL COMPANY (INDIANA)**

# of your loaders . . .

## Superla Mine Lubricants

**Y**ou can avoid costly delays and interruptions in machine production by switching to the new Superla Mine Lubricants. The qualities given to these lubricants help boost loader production 4 ways.

**Reduce downtime for maintenance.**

Superla Mine Lubricants resist heat and thus minimize deterioration of the lubricant and the formation of carbon. Cleaner and more protective lubrication of loader transmissions prevents wear, reduces downtime for maintenance.

**Eliminate warm-up time.** Superla Mine Lubricants are fluid at low temperatures. When machines start, controls operate freely and without drag. Loading operations can be started immediately.

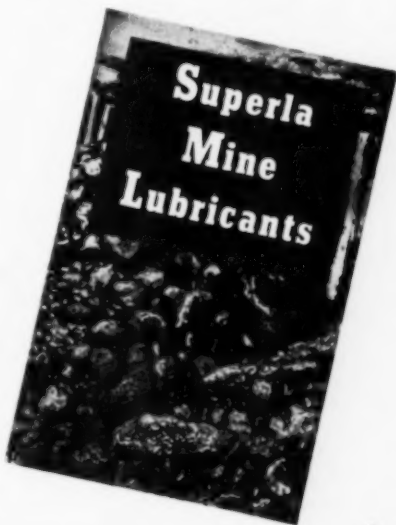
**Permit faster loading.** Superla Mine Lubricants keep clutch plates clean and permit smooth operation of controls. This allows easier handling of machines, results in faster loading.

**Shorten servicing time.** Superla Mine Lubricants (except the two heaviest grades, which are used only for special loader conditions), pour

readily from bung-type barrels. They also handle easily in all types of dispensing equipment. No time is wasted when the lubricant is applied.

More and more midwest mines are profiting through the time and cost savings provided by Superla Mine Lubricants. A Standard Oil Lubrication Engineer will be glad to tell you about many actual performance records. Use his evidence as the basis for a trial of Superla Mine Lubricants in your equipment. Grades are available for both oil- and grease-lubricated loaders.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

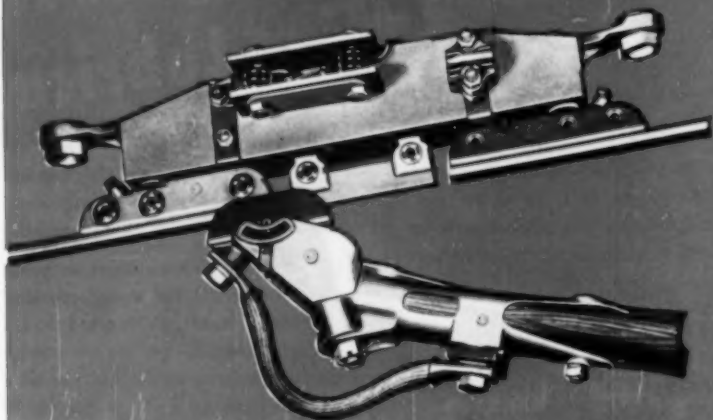


**Send for this booklet.** The booklet illustrated at the right describes how the new and improved Superla Mine Lubricants meet your specific requirements for mine-machine lubrication. A copy will be sent at your request.

### STANDARD OIL COMPANY (INDIANA)



# "A LEVEL HIGHWAY"

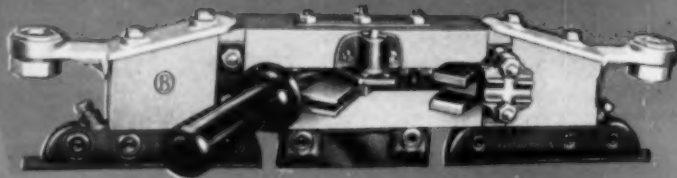


**O-8 TYPE-T SECTION INSULATOR**—End runners grip the wire by top lobe only. The center runner is adjustable to keep it at the same level as the trolley wire. When furnished with a fused magnetic blow-out, the center runner is energized, preventing arcing as the collector passes through the insulator.



**O-8 BULLDOG SPlicer**—Firmly holds two sections of wire together with set screws firmly gripping the wire by the top lobe. Combination Bulldog Splacers are available to join to different sized wires on the same running level.

**O-8 TYPE-S SECTION INSULATOR SWITCH**—With the same under-run feature as the Type-T insulator, this switch can be safely opened under load when necessary. Magnetic Blow-Out Coils quickly and harmlessly extinguish any arc formed when a heavy electrical load is broken.



**O-8 TYPE-T SECTION INSULATOR SWITCH**—Identical with the Type-T Section Insulator in Smooth Under-run design. A heavy, double blade switch is added for sectionalizing trolley or both trolley and feeder in the one unit.

# IN THE SKY"

## When Your Trolley Overhead Has O-B Smooth-Underrun Fittings From Face to Tipple

You give your current collectors a smooth, level highway when you install the full line of O-B Smooth Underrun Fittings. There's no jarring and bouncing of the collector to form heavy, wire-burn-arc. The collector path is wire-level and wire-smooth from face to tipple.

Ended for good are the "bumps, blows and burns" caused by bulky, off level, wire encircling fittings. Wire encircling cause the collector to bounce away from the wire and are a constant source of heavy arcing. This arcing accelerates the wearing of both wire and collector.

O-B Smooth-Underrun Fittings keep the collector path clear. The collector shoe glides under switches and through frogs on the wire level. Smooth Underrun Fittings grip the trolley wire by the upper lobe, leaving a free, unobstructed surface for the collector. Anchor tips butt the wire firmly against frog and crossover runners, providing a level passage from wire to runner.

Your locomotives can operate safely at higher speeds with this new trolley overhead. Plan your next overhead trolley system with O-B Smooth-Underrun Fittings and get continuous wire smoothness from face to tipple.



**Ohio Brass**

MANSFIELD, OHIO  
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

**O-B TYPE-M TROLLEY FROG**—Designed with runners having a cross section similar in size and shape to that of trolley wire. Anchor tips hold the wire firmly against runner providing a smooth passage for the current collector to the frog. Beveled ramps guide the shoe through the frog and back up the wire without bumping.





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WITH HALF-WAY MEASURES...**

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and be certain**



**— the FACTORY INSERTED Ring insures FULL PENETRATION  
of the Silver Alloy . . . a perfect joint**

Today, contractors . . . builders . . . architects are using brazed connections, in ever increasing numbers on their brass and copper pipe runs. However, they must be certain that the correct brazing alloy is used; that the joint has penetration of alloy up the shoulder of the fitting.

That's why more and more are turning to Silbraz® joints made with Walseal valves, fittings and flanges which assure the proper amount of alloy with no waste. They know that the finished joint not only will withstand hydrostatic pressure, but it will also withstand terrific impact and vibration — in fact, no correctly made Silbraz joint has ever been known to creep or pull apart under any pressure,

shock, vibration or temperature which the pipe itself can withstand.

Furthermore, it is a relatively simple operation to make a Silbraz joint — no heavy scaffolding need be erected . . . just cut the pipe, flux, assemble, then braze, following the technique recommended by the Walworth Company. A silver brazing alloy — FACTORY INSERTED — in each port flows out when heated with the oxyacetylene torch, making a joint that is stronger than the pipe itself . . . a one-hand operation, with the mechanic out of the path of the deflected heat — at all times.

*For full information about Silbraz joints made with Walseal products, write for Circular A-1.*

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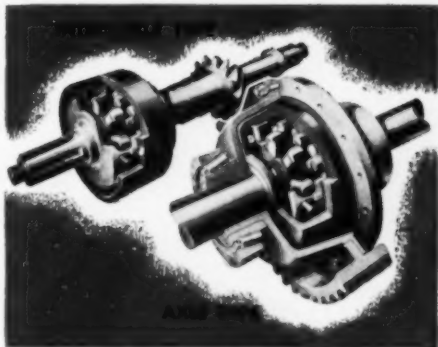
NO PLACE FOR...

# "STICK-IN-THE-MUDS"

◆ Trucks that stick in the mud are an expensive proposition when you're trying to get the big loads out on stepped-up schedules. When they bog down, profits go right down with them.

Masters of the mire, Mack six-wheelers keep going through slippery mud and sand because they have the benefit of Mack's exclusive Power Divider. This unique device divides torque between the two bogie axles and between the four driving wheels. Torque is delivered proportionately to wheels having the most traction, thus eliminating dissipation of power in useless slippage and wasteful wheel spinning.

If "stick-in-the-muds" are holding you back, it will pay you to investigate the profit possibilities of dependable, hard-working Mack trucks. Write or call your nearest Mack branch or dealer for the complete story on what Macks can do for you.



## it's a job for **MACK TRUCKS**



IT'S PART OF THE LANGUAGE

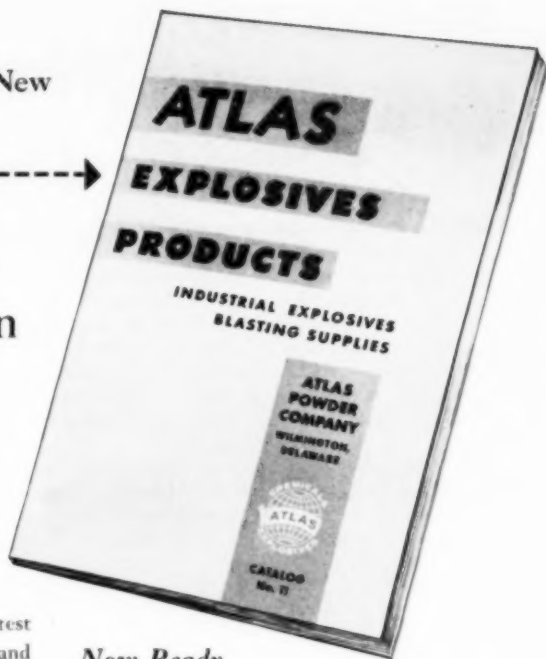


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## HOW TO MINE MORE COAL AT LESS COST



Big capacity, COR-TEN-built eight-wheelers like these speed up work at the face by reducing frequency of car changes. Can operate at normal speed through curves, without butting or spillage.

### Use BIGGER cars... built to last longer with **U·S·S COR-TEN**

**B**IG capacity cars—as big as the physical measurements of your mine allow—will boost your production and reduce your costs because they permit more efficient utilization of loading-machine capacity. It's a proven fact.

It is also a matter of record that if mine cars are properly designed, and built larger and stronger with U·S·S Cor-Ten steel, you can confidently expect additional dividends in lower operating costs, in reduced repairs and maintenance, and in greatly increased life.

Why? Because Cor-Ten steel mine car construction is stronger, more resistant to corrosion, to impact, to fatigue, and to abrasion. U·S·S Cor-Ten steel is half again as strong as ordinary carbon steel. Its resistance to atmospheric corrosion is 4 to 6 times greater than plain steel. As a result Cor-Ten cars will absorb abuse and accidental

damage that would put cars of other construction right out of service.

Because U·S·S Cor-Ten is strong and stands up so well under wear and tear, cars can be built larger with no loss in strength, will last longer under heavy duty.

To date, more than 20,000 Cor-Ten mine cars have been placed in service. They are operated by 55 of the country's most progressive companies under every sort of condition. What's more, 53% of these cars have been built on repeat orders—after operators had ordered test cars, tried them under their own conditions, and found them to be a great improvement over old-type construction.

For detailed information about U·S·S Cor-Ten steel, write for the "Cor-Ten Book." Simply address a card or letter to Carnegie-Illinois Steel Corporation, 2103 Carnegie Bldg., Pittsburgh 30, Pa.

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UNITED STATES STEEL

**In Two Minutes You Can See  
Exactly How...**

# The Concave Side

(U.S. Patent No. 1813698)

**SAVES Your Transmission DOLLARS**

Take *any* V-belt in your hands and bend it as it bends in going around a pulley. You will see that the top of the belt, being under *tension*, grows *narrower*. The body, under compression, *widens*. The sides *bulge out*.

This shape change—in a *straight-sided* V-belt—is shown in Figures 1 and 1-A, below.



Fig. 1  
Straight-Sided V-Belt



Fig. 1-A  
How Straight-Sided V-Belt  
Bulges in Sheave-Groove.

Now look at Figures 2 and 2-A. There you see how the *same shape change* affects the V-belt built with the precisely engineered *Concave Side* (U.S. Patent No. 1813698).



Fig. 2  
Gates Vulco Rope  
with Concave Side.



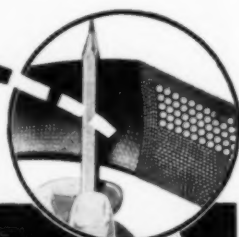
Fig. 2-A  
No Side Bulge.  
Precise Fit in Sheave Groove.

The top of the belt narrows, the body widens. But the sides *merely straighten*—and the new shape *exactly fits* the sheave groove!

Two savings result. (1) Uniform side-wall wear—*longer life!* (2) Full side-wall grip on the pulley carries heavier loads and *sudden load increases* without slipping; saves belts, saves power!



You can actually *feel*  
the sides of a belt *change shape*  
as the belt bends.



The Mark of **SPECIALIZED** Research

**The Concave Side is  
MORE IMPORTANT NOW Than Ever Before**


Because the sides of a V-Belt are what actually drive the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley directly through the belt's sidewalls.

Now that Gates **SPECIALIZED** Research has made available to you **SUPER Vulco Ropes**—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

4910

**GATES VULCO ROPE DRIVES**  
In All Industrial Centers

**THE GATES RUBBER COMPANY**  
DENVER, U.S.A.  
The World's Largest Makers of V-Belts


**UP TO 90%  
MORE WEAR**

**Roebing Roeflat  
Aggregate Wire Screens**

**CRIMPING that puts the CRIMP in SCREEN COSTS**

"HOW COME 90% MORE WEAR?" The answer's easy . . . it's Roebing ROEFLAT, an improved kind of wire screen. The wire lies flat except at the short crimps . . . has 75% more wearing surface . . . gives up to 90% more working life and wear with no sacrifice of

working area . . . slashes screen costs.

But ROEFLAT users get other profitable advantages, too. ROEFLAT's smooth, level surface causes less clogging and blinding than ordinary screens. Its precision openings assure uniform grading and new screening efficiency.

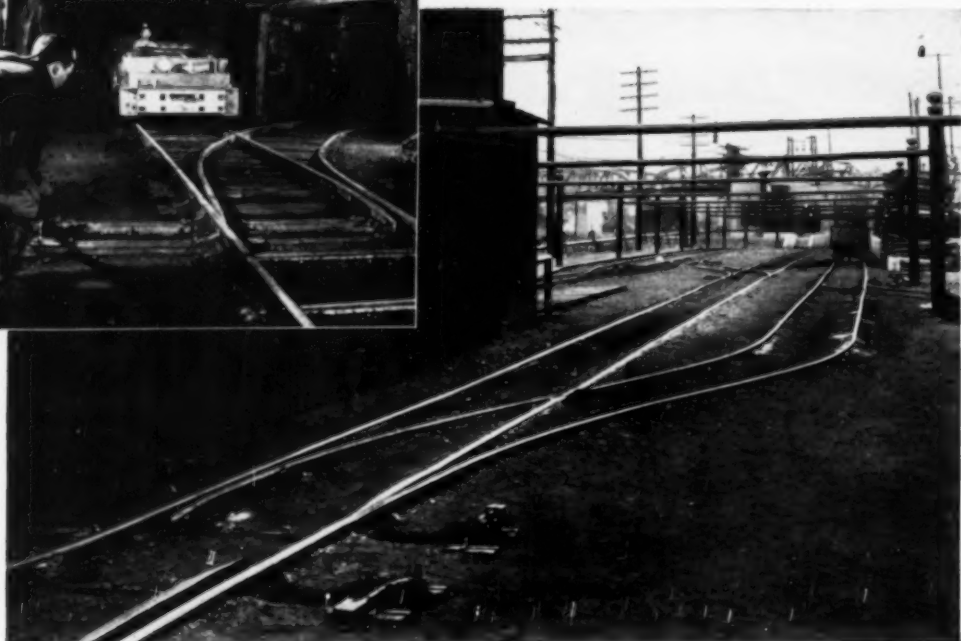
Roebing ROEFLAT is available in practically any type of construction, such as ROETON, ROESLOT or square mesh, with openings of  $\frac{1}{8}$ -inch or larger. Before placing your next screen order, find out whether ROEFLAT will give you improved service. Write for Catalog W-903.

**WOVEN WIRE FABRICS DIVISION**  
 OF JOHN A. ROEBLING'S SONS COMPANY  
 ROEBLING, NEW JERSEY

**ROEBLING**

☆ A CENTURY OF CONFIDENCE ☆





# *Tonic* to sluggish haulage systems

For a number of years, Bethlehem prefabricated track has been recognized as a tonic to sluggish haulage systems. Underground and on the surface too, its use has reduced traffic snarls and made it possible to haul more coal in less time. Here's a track idea that's really grown—and is still spreading in both the anthracite and bituminous fields.

There are several reasons. One is the moderate cost—and it *is* moderate, surprisingly so. Another is the comprehensive plan submitted by Bethlehem engineers after a study of your mine; a plan that helps relieve you of many annoying details.

Still another point is that Bethlehem prefabricated track is delivered precut and precurved, with everything ready for quick assembly. The number of different rail lengths, both straight and curved, is held to a minimum. Highly-trained mine-track crews are not needed. Putting the job together is simple—so easy that almost anyone can get the hang of it in no time.

A Bethlehem prefabricated track system comes to you complete, with rails, switches, switch stands, turnouts, frogs, steel ties, joint bars and other components all included. Why not call the nearest Bethlehem man for full details?



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation  
Export Distributor: Bethlehem Steel Export Corporation

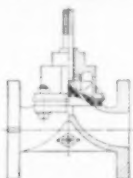
## BETHLEHEM PREFABRICATED TRACK

# NEW! Grinnell-Saunders Diaphragm Valves power operated by Bendix-Westinghouse Rotochambers

*dependable power operation and remote control*

## FEATURES:

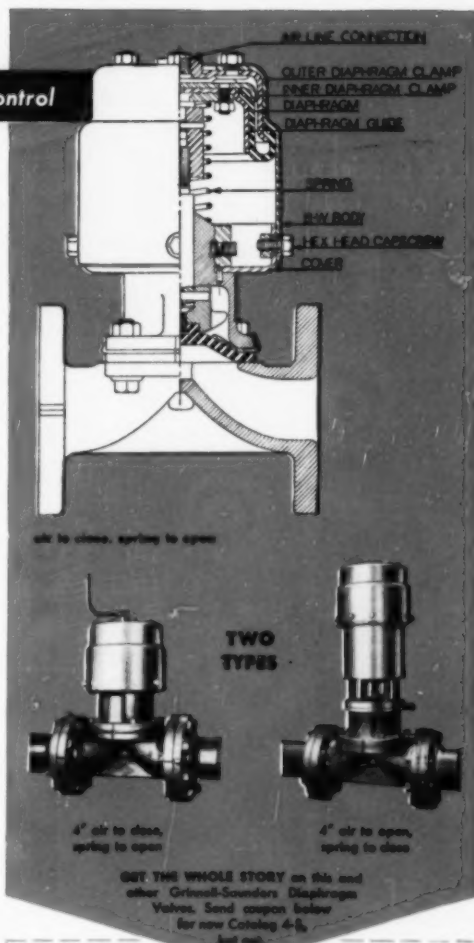
- Bendix-Westinghouse Rotochamber top-works has rolling sleeve type of seal . . . leakproof and practically frictionless. No packing glands and no lubrication required.
- Pressed steel cylinder is neat looking, light and compact. Height of 2" flanged air-to-close valve from center line to top is only  $9\frac{3}{4}"$ ; air-to-open valve (in open position) is  $14\frac{1}{8}"$ .
- Bendix-Westinghouse top-works has been tested up to seven million strokes without any sign of wear or failure.
- Top-works may be operated with air or hydraulic pressures up to 105 pounds. For pressures up to 100 pounds in the line being controlled, an actuating pressure of only 50 pounds is required under average conditions. Pressure reducing valves are not required for pressures up to 105 pounds because of adjustable stem travel stops incorporated in the valve bonnet design.
- Adjustment is easily made without removal of top-works from valve body.



Sliding stem bonnet assembly is suitable for use with other valve motor units. Sliding stem bonnets are interchangeable with other bonnet designs.

## YOU GET THESE ADVANTAGES IN ANY GRINNELL-SAUNDERS DIAPHRAGM VALVE:

Diaphragm isolates working parts from the fluid, preventing corrosion of these parts and contamination of the fluid; diaphragm opens wide for streamlined flow; diaphragm presses tight for positive closure, even with suspended solids in the line; body, lining and diaphragm materials to meet service conditions; simple maintenance.



Grinnell Company, Inc.  
266 West Exchange St.  
Providence 1, R. I.

Please send me a copy of your new Catalog 4-S of Grinnell-Saunders Diaphragm Valves.

Name

Company

Address



# GRINNELL

new

U. S. BUREAU  
OF MINES  
APPROVED

PERMISSIBLE  
ELECTRIC CAP LAMP  
APPROVAL NO. 128



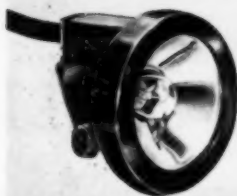
CAUTION

THOMAS A. EDISON

Any electrical and non-electrical equipment shall not be used in the same way as the lamp.

25%

The tough nylon plastic battery case is exceptionally resistant to abrasion, denting and impact. All exposed parts are of stainless steel.



Comfortably balanced headpiece contains an efficient gas-filled bulb with two filaments of equal candle power. New bezel locking device permits quick removal and reassembly of the reflector, bulb or rubber-cushioned lens.

*brilliance* for even greater mining efficiency

with the new

**EDISON**

ELECTRIC  
CAP LAMP

model

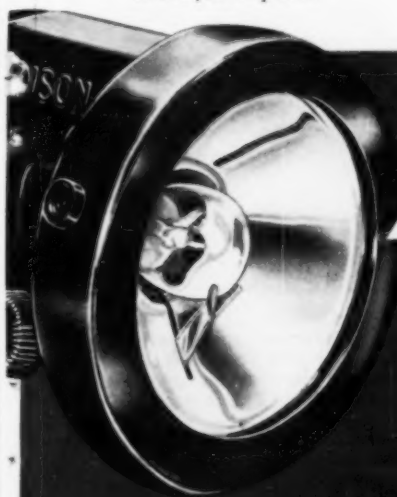
**R-4**

New from headpiece to battery case, the brilliant Edison Model R-4 gives better light for the miner on every job . . . gives at least 25% more light than other miner's cap lamps. With its increased candle power, the Model R-4 gives a new brilliance that means greater safety for miners and improved mining efficiency—an achievement worthy of the great name, Edison.

Another Edison first in mine lighting is the new focusing headpiece. The brilliant, unfailing, dependable light can be focused to an intense "spot," or a floodlight provided as the job requires.

#### HEADLINE FEATURES

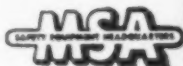
- Positive "Spot" Adjustment
- Floodlight When Required
- Comfortably Balanced Headpiece
- Four-Cell Edison Nickel-Iron-Alkaline Battery
- Welded Steel Cell Containers
- Tough Nylon Plastic Outer Case



*more  
light*

*than ever before available  
in a miner's cap lamp*

Demonstrations and detailed facts? Gladly, upon request.



#### MINE SAFETY APPLIANCES COMPANY

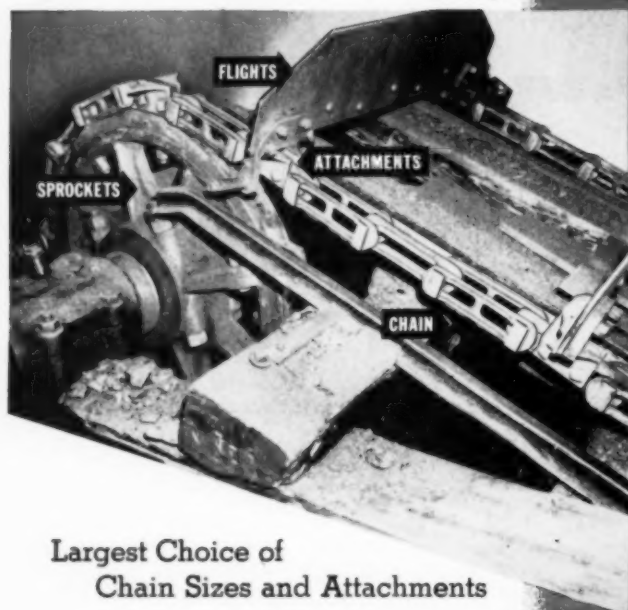
BRADDOCK, THOMAS AND MEADE STREETS . . . . . PITTSBURGH 8, PA.

At Your Service: 48 BRANCH OFFICES in the UNITED STATES

MINE SAFETY APPLIANCES CO. OF CANADA (LIMITED) . . . . . Toronto, Montreal, Calgary, Winnipeg, Vancouver, New Glasgow, N.S.  
Representatives in Principal Cities in Mexico, Central and South America . . . . . CABLE ADDRESS: "MINSAP" PITTSBURGH

WILMOT HAS

# Everything for your CONVEYOR



As the originators of Rivetless chain conveyors, Wilmot Engineering Co. manufactures a complete line of parts for all sizes of coal, sludge and ash conveyors. This enables you to enjoy the advantages of placing single responsibility for supplying all your replacement needs.

## Largest Choice of Chain Sizes and Attachments

By enabling you to depend on one source of supply for all your conveyor parts, Wilmot can solve both design and delivery problems for you, and thus prevent "down" time. As shown in our new 280-page catalog, Wilmot supplies the widest selection of rivetless chain sizes and attachments available.

**Wilmot Stocks All Specified Sizes of "Rivetless" Chain; for 3,000 to 130,000 lb. Loads**

We stock, for prompt shipment in any quantity, all sizes of Keystone rivetless chain in pitches from 3" to 10 $\frac{1}{2}$ " and working loads from 3,000 to 130,000 lbs.: of drop-forged EEE alloy steel, normalized or heat-treated; or alloy steels 3140 and 3240, heat-treated. In addition to the largest selection of attachments, Wilmot also has, or will design, every-



thing for your coal, sludge or ash conveyors: cast iron or steel flights, sprockets, traction wheels, take-ups, shafting, bearings, casings, trough and all other needed parts.

Send for  
**NEW 280-PAGE BOOK ON CHAINS**  
Conveyors, Elevators



## WILMOT ENGINEERING CO.

HAZLETON, PA.  
Plant:  
WHITE HAVEN, PA.

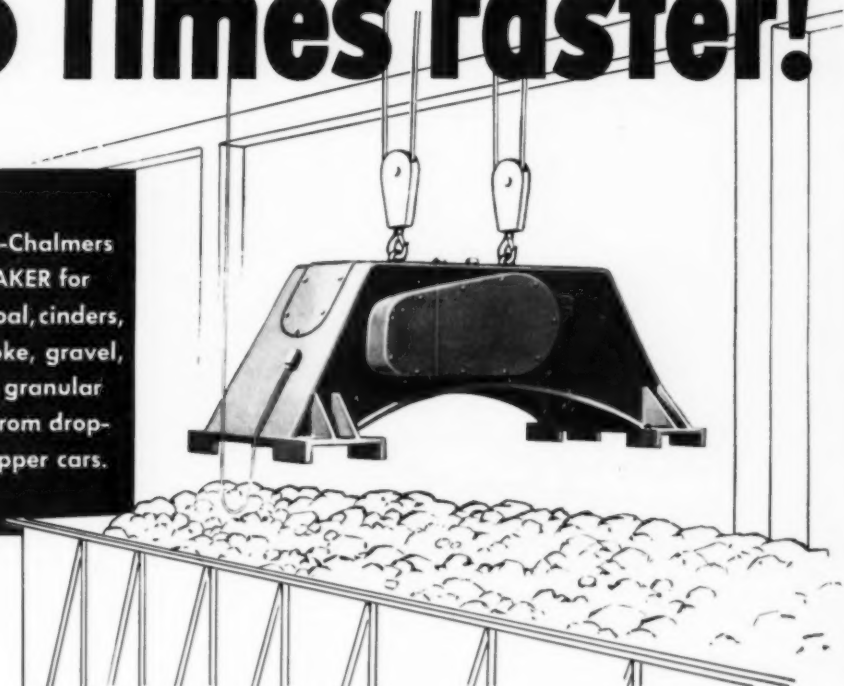
Wilmot Coal Preparation Equipment: Hydrotators • Hydrotator-Classifiers • Hydro-Separators • Simplex Jigs  
Crushing Rolls • Sizing Shakers • Bucket Elevators • Conveyors • Car Hauls • Keystone Rivetless Chain, etc.

**WILMOT BUILDS BETTER BREAKERS**



# Now! Unload Coal 15 Times Faster!

**New! Allis-Chalmers  
CAR SHAKER for  
unloading coal, cinders,  
ore, slag, coke, gravel,  
and other granular  
materials from drop-  
bottom hopper cars.**



**A TYPICAL EXAMPLE:** In as little as two minutes a gondola car of 1 1/4 x 0 in coal screenings can be unloaded with the new Allis-Chalmers Car Shaker. Manual unloading of the same car would take up to 30 minutes!

And you save on safety! Accidents are eliminated as workmen do not have to mount the car during the automatic unloading operation. Vibratory motion of the Shaker is transmitted to the car and loosens bridged granular material so it flows freely through the hopper openings.

The Shaker is driven by a 15 hp, high torque, integrally enclosed Allis-

Chalmers motor — mounted on rubber to protect motor from severe vibration.

For complete information on how this new Car Shaker can help you save time and money, contact your nearby A-C Sales Office. Or send in the handy coupon below.

## CHECK THESE SIX MONEY AND LABOR SAVING FEATURES!

1. Motor is located inside body; drive completely covered by guard.
2. Size of body and shoes designed to fit all hopper cars operating on the North American continent.
3. Simplified mechanism reduces num-

ber of working parts.

4. Hydraulic arrangement for bearing removal.

5. Car Shaker heavily designed—Stress relieved after welding and before machining.

6. Shaker is well balanced for ease in handling by crane or hoist.

A-2748

# ALLIS-CHALMERS



ALLIS-CHALMERS, 968A SO. 70 ST.  
MILWAUKEE, WIS.

Please send Car Shaker Bulletin C787221.

Name

Title

Firm

Address



# Mc NALLY PITTSBURG

## *A Helping Hand*



PLANT RE-DESIGN  
AND ADDITIONS

TALK-IT-OVER  
STAGE

CRUSHING AND  
RE-SCREENING

COARSE AND FINE  
COAL DRYING

COMPLETE  
PLANTS

To help you meet and beat competition in growing aggressive coal markets, McNally Pittsburgh extends a helping hand.

One of the outstanding achievements of McNally Pittsburgh is the ready-built Unit Washer, engineered to provide low-tonnage mines with a practical cleaning system at very low cost.

The Unit Washer can be built economically into your present plant or installed as a complete Unit Washer addition to your plant.

Installations now in use in a number of plants are successfully...

- handling low tonnages with maximum cleaning efficiency.
- satisfying customers' demands for coal prepared to a predetermined ash content.

You may have other coal preparation problems to discuss. McNally Pittsburgh engineering department offers the helping hand and complete consulting service on all of the subjects listed here.



A strip mine screening plant that enables its operator to continue to satisfy customers year after year.

Shaft mine screening plant that produces coals which would not be sufficiently improved by washing to justify the washer addition.



In some areas tonnages as low as 200 tph, such as in this plant, require complete screening and washing to get in the market and stay there.

## McNALLY & PITTSBURG

CONSULTANTS and MANUFACTURERS  
OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburgh Manufacturing Corporation

Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio

Engineering & Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

## TO OPERATORS REQUIRING SMALL WASHING PLANTS

### FROM 30 TO 90 TPH TO MEET COMPETITION

Here is the one and only Unit Washer that embodies the Baum jig principle of separating coal from in-combustible impurities. It is not a new and untried unit of equipment . . . it has been in actual use during the past 8 years in a number of plants where it is proving highly efficient and most satisfactory.

With it, operators requiring small washing plants have all the advantages of the same washing principles, the same rejection principles, as the big plants with washing requirements from 500 tph to 2000 tph and more.

This McNally Unit Washer handles coal from 5" to zero, in tonnages from 30 to 90 tph. Fully automatic. Patented float control adjusts washer to changes in raw coal feed. Washer requires minimum operating attention. Delivered complete, ready for erection.

McNally Engineers train your operator, place Washer in service at your plant. For further details, write for Bulletin 649.



*Let Us Show You How This*  
**EFFICIENT, AUTOMATIC UNIT WASHER**

**CAN BE INSTALLED IN, OR ADDED TO, YOUR PRESENT TIPPLE**

# 10 BIG REASONS...



## The 42-T Means Low Blast Hole Drilling Costs For You! 1 9" to 12" Holes

— The big 42-T has plenty of capacity and power for drilling large diameter holes. With its 46-foot derrick, the 42-T swings up to 6,000 pounds of tools.

**2 Hard-Hitting Drilling Action**—Rubber shock absorber gives you the sharp, shattering blows needed to penetrate hardest mine and quarry materials.

**3 Snappy Up-Stroke**—Rapid expansion of rubber shock absorber snaps tools back away from bottom of hole. Quick pickup permits effective operation with up to 55 strokes per minute.

**4 Telescoping Derrick**—All-steel welded construction provides great strength without excess weight . . . permits moving between holes with derrick up and tools suspended.

**5 Tractor-Like Mobility**—Full-length caterpillar mounting means quick, easy moves over all types of ground. Has tractor-like steering controls.

**6 Low Maintenance Costs**—Rigid box-frame, shock absorber, and rubber insulated sheaves protect machinery from vibration, reduce cable wear by keeping shock loads low.

**7 Easy, Safe Control**—Convenient location of controls eliminates unnecessary reaching or moving about the rig.

**8 Non-Skid Operating Platform**—Pressed non-skid steel floor gives better footing to men working up off wet, rocky ground and out of slippery muck.

**9 Fast, Easy Leveling**—Hydraulic leveling jacks, offered as auxiliary equipment, give substantial increases in production through big savings in leveling time . . . entirely eliminate elaborate ground preparation as well as blocking and cribbing.

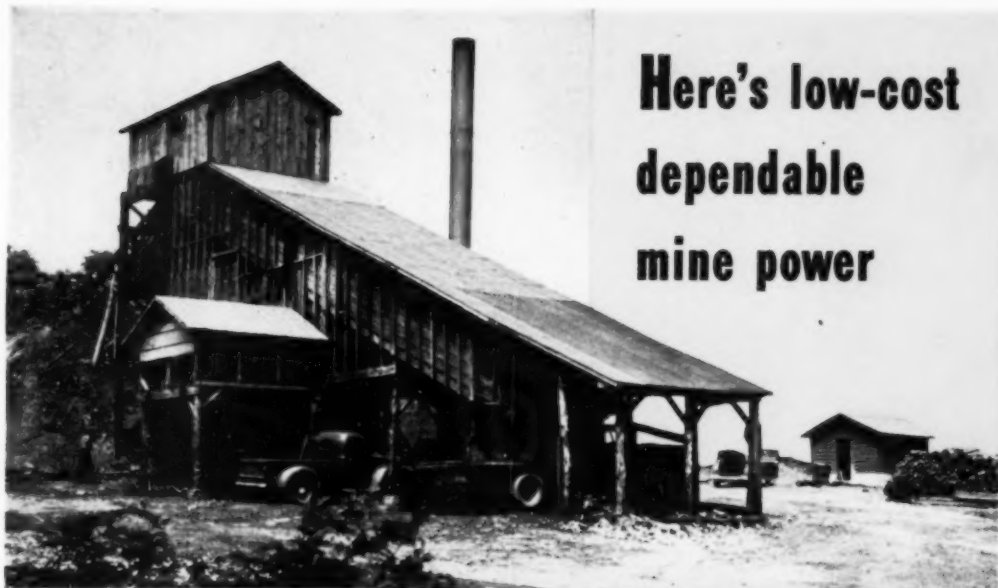
**10 Smooth Ample Power**—To suit your specific blast hole drilling requirements is furnished by either diesel engine or electric motor.

Analyze your blast hole drilling costs — check into the outstanding drilling economies you can get with a Bucyrus-Erie 42-T! Also investigate other units in the complete line of Bucyrus-Erie blast hole drills — 22-T for 5 1/2" to 6 1/2" holes, 27-T for 6" to 6 1/2" holes, and the 29-T for 6" to 9" holes.

**BUCYRUS  
ERIE**

South Milwaukee, Wisconsin

32049



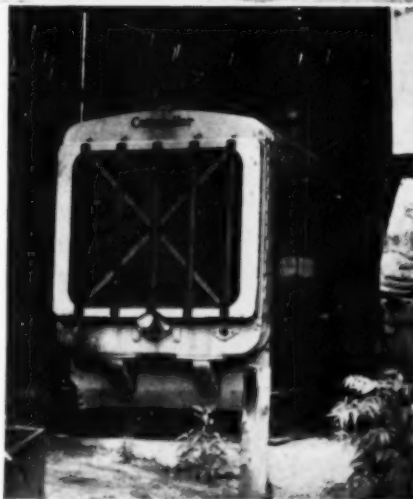
**Here's low-cost  
dependable  
mine power**

**I**N R. L. O'Bryan Coal Company's shaft mine, near West Louisville, Kentucky, a "Caterpillar" Diesel D13000 Engine is doing a typical "Caterpillar" job for its owners, working steadily and profitably. The engine drives a generator supplying power for the coal-cutting machine, drills, pump and lights. Production is 150 tons per 8-hour day.

Dependable performance is the first consideration in a mine engine, and "Cat" Diesels can be counted on to deliver steady power, under full load, month after month. Built in the world's most modern engine plant and precision-tested for honest rated horsepower output, they have the stamina for long work life with minimum time out for repairs. Many "Caterpillar" Diesels in mine operation have records of 40,000 hours or more. And the fact that they use non-premium fuel adds still more to their economy.

For both strip and shaft mining, "Caterpillar" Diesel Engines are available in all makes of shovels, air compressors and other types of mining machinery. Specify "Caterpillar" Diesel power on your machinery order. "Caterpillar" dealers everywhere are equipped to give you the best in service.

**CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS**



**CATERPILLAR TRACTOR CO.**  
BOX CA-12, PEORIA, ILLINOIS

Send me a copy of your booklet, "Mining for a Profit."

Name

Address

**CATERPILLAR**

REG. U. S. PAT. OFF.

**DIESEL**

**ENGINES • TRACTORS • MOTOR GRADERS  
EARTHMOVING EQUIPMENT**



the **M-R-C** "Synthe-Seal" bearing  
Patented, Registered

A standard-dimension ball bearing with a removable synthetic rubber seal for keeping out dirt, grit and moisture and for keeping in lubricant.

**MARLIN ROCKWELL CORPORATION, Jamestown, N. Y.**



# Announcing...



## NEW Kennametal Hitch Bits



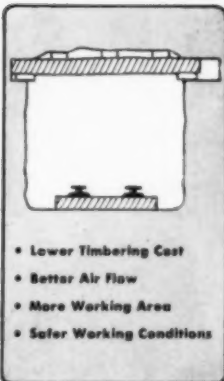
Kennametal Hitch Bits are set with 10 "finger bits" having hard durable cutting edges of solid Kennametal Cemented Carbide. Tough body construction assures lasting service.

Here is a new bit developed by Kennametal that provides easier, faster, and more economical mine timbering. It drills nine and one-quarter inch diameter holes and can be used on mounted drills that have a capacity of 5 h.p. or more. Holes are drilled three feet deep in one rib and one and one-half feet deep in the other. The crossbar is installed by sliding it into the longer hole and sliding it back into the short hole. Timbers are accurately positioned and posts are eliminated.

The time, cost, and trouble of treating, hauling, cutting, erecting, and wedging posts are eliminated... air course efficiency vastly improved.

Your Kennametal representative will be glad to give you more particulars on this safe, fast, economical method of timbering.

Mining Division...  
Kennametal Inc., Latrobe, Pa.



# KENNAMETAL

Trade Mark Reg. U. S. Pat. Off.

DRILL BITS • MACHINING BITS • STEEL BITS • ROCK BITS

KENNAMETAL INC., Latrobe, Pa.

Send me a free copy of folder describing the new Kennametal Hitch Bit.

Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

CLIP THIS  
COUPON  
— mail for  
particulars  
today!





MEMO from H.T.

Bob:  
On next order for  
machine, carriage and  
lag bolts, suggest  
you contact Bethlehem.  
They have complete  
line. H.T.



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by  
Bethlehem Pacific Coast Steel Corporation  
Export Distributor: Bethlehem Steel Export Corporation

*Other Bethlehem Fastenings  
for Mines*

SPIKES • TRACK BOLTS • RIVETS  
THREADED RODS  
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Under all conditions the proved performance of Tycol lubricants more than meets their recommended service.

Rigidly controlled and tested during manufacture . . . and refined from the highest grade crudes, Tycol oils and greases are known for their \*UNIFORMITY within each classification — from the first drum to the last.

This unvarying high quality, plus the scope of the line, accounts for Tycol's wide acceptance by industry interested in maximum production . . . top efficiency . . . lowest operating cost.

Whatever your lubrication need, let a Tide Water Associated engineer help you select the one suited for your particular need. Call, write or wire your nearest Tide Water Associated office for full details.



Boston • Charlotte, N. C. • Pittsburgh • Philadelphia • Chicago  
Detroit • Tulsa • Cleveland  
San Francisco • Toronto, Canada

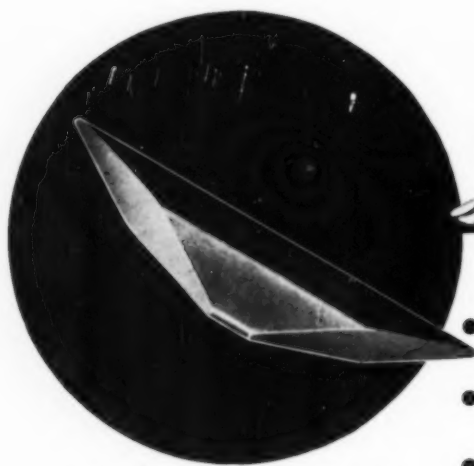


\*LEARN WHAT THIS PRODUCT CHARACTERISTIC MEANS TO YOU — READ "LUBRICANIA"  
This informative handbook, "Tide Water Associated Lubricania," gives clear, concise descriptions of the basic tests used to determine important properties of oils and greases. For your free copy, write to Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

REFINERS AND MARKETERS OF VEEDOL — THE WORLD'S MOST FAMOUS MOTOR OIL

# There's No Bits Like Duplex Bits

.... it's a statement you hear over and over again in mine after mine from machine runners and service men alike. It's also the consensus of opinion of mine operators and the men who are alert to operating and cutting costs. For the BEST in BITS .... for the BEST in Coal Cutting equipment .... it's the same year after year .... "CINCINNATI MINE".



**CINCINNATI**  
REVERSIBLE DOUBLE ENDED  
**DUPLEX BIT**

- The Cincinnati Duplex Bit used with Cincinnati Chains uses less power.
- Cincinnati Duplex Bits are made of high grade alloy steel . . . expertly heat treated.
- Cincinnati Duplex Bits with Cincinnati Chains cut faster . . . assure coarser cuttings . . . decreases machine maintenance costs.
- Outlasts and outcuts ordinary  $\frac{1}{2}$ " x 1" bits.
- Materially reduces bit setting time . . . eliminates bit sharpening operations.

## THE CINCINNATI MINE MACHINERY CO.

2983 SPRING GROVE AVENUE • CINCINNATI, OHIO



## Huge *one piece* BWH Belt DESIGNED TO CUT WASTE LINES!

When BWH engineers were called on to produce a fast, power-saving, economical belt for a coal mine, this 13-ton Silver King ROTOCORD BELT was the result. It's one of the largest one piece conveyor belts ever produced. Made by the famous, exclusive BWH ROTOCURE Process of continuous vulcanization, this giant is 1576 feet long,

48 inches wide. It will haul better than 500 tons an hour on a rugged grade at the fast clip of 400 feet per minute. Maintenance worries are lessened by the absence of splices. It's another top performance by BWH . . . leaders for 71 years in the manufacture of mechanical rubber goods of dependable ruggedness for use in all industries.

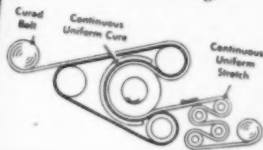
HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems. We're specialists in solving them. Consult your nearest BWH distributor or write us direct.

# BWH



DEPENDABLE RUGGEDNESS

This is the ROTOCURE Process of continuous vulcanization, exclusive with BWV. It does away with the 30 to 40-foot overlaps occurring in the duck carcass in old-fashioned flat-press curing, eliminates the possibility of operational weakness caused by such overcuring.



Another Quality Product of  
**BOSTON WOVEN HOSE & RUBBER COMPANY**

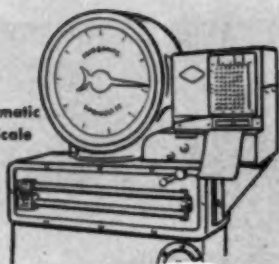
Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS., U.S.A. • P.O. BOX 1071, BOSTON 3, MASS.

Bench  
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Printomatic  
Dial Scale



Portable  
Dial Scale



## The easy WAY to *WEIGH* FAIRBANKS-MORSE Scales

Fast, accurate, easy-to-read, easy-to-handle Fairbanks-Morse Scales offer the easy way to "weigh." Because these lastingly accurate weighing instruments are designed for fast, dependable operation . . . for maximum ease of reading, they speed weighing operations . . . minimize the chance of costly human error.

There is a Fairbanks-Morse Scale for every weighing operation. Your Fairbanks-Morse weighing expert will be glad to assist you in selecting the right style and size for your operations. Fairbanks, Morse & Co., Chicago 5, Ill.



## FAIRBANKS-MORSE

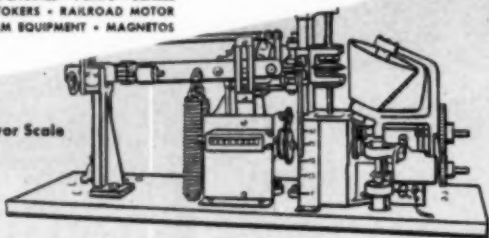
**A name worth remembering**

DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES  
MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR  
CARS and STANDPIPES • FARM EQUIPMENT • MAGNETOS

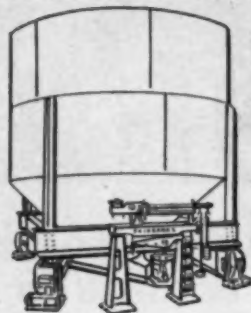
Weigh Can  
Scale



Belt Conveyor Scale



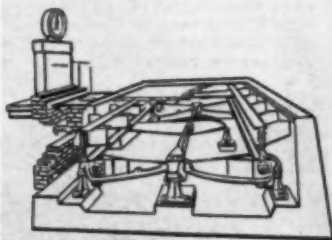
Hopper Scale



Full Capacity Beam



Counting  
Scale



Truck Scale

# Barber-Greene

## *Sensational*

**NEW CAR UNLOADING  
TEAM!**



**unloads car of rock or crushed stone  
in 45 minutes**

**358**

### **B-G HOPPER CAR UNLOADER**

Here's a rugged all-material unloader that's completely new in design. The 358 cuts hopper car unloading time as much as 90%—unloads most any bulk product from fine sandy material to large-sized rock aggregates at capacities up to 3 tons per minute—empties a 60-ton car in as little as 45 minutes without jam-ups or delays. There's positive material flow at all times. Easily "spotted" in track pit or above rails—really portable—can be towed at normal traffic speeds.

**363**

### **B-G PORTABLE CONVEYOR**

The newly designed B-G Model 363 Portable Conveyor is an extremely flexible machine that will prove to be profitable to yards, industrial plants, contractors, etc. Speeds up stockpiling or transfer of material from car or stock pile to trucks. Entirely new in design, the 363 features V belt drives, pneumatic tires, shock absorbers, towing hitch, and a host of new improvements. Send for new attractive literature on these two great B-G machines.



**BARBER • GREENE COMPANY, AURORA, ILLINOIS**

*Constant flow Equipment*



**LOADERS**



**PERMANENT CONVEYORS**



**PORTABLE CONVEYORS**



**COAL MACHINES**



**BITUMINOUS PLANTS**




**FINISHERS**



**DITCHERS**





# Can a *WEAK LINK* halt your transportation system?

## *Not if you have MINE CARS!*

Continuous coal hauling and steady coal hauling are entirely different things. Here is why mine cars can be depended on to get the coal out all day, every day.

A well-thought-out system of mine car transportation will almost never delay coal hauling for more than a short time.

One weak link means only that one car is pulled onto a siding, or one length of track is replaced. Delays are measured in minutes, instead of hours. Every other mine car in the entire operation can haul coal at full capacity. Cutting and loading operations are usually not affected at all. Mine car repairs, when necessary, are made with ease, in the mine's own repair shop, with all necessary equipment right at hand. And practically all mine car repairs are inexpensive! It illustrates the fact that A.C.F. Mine Cars are the cheapest, most dependable way to haul coal. Our Sales Representatives will be glad to give you the facts.

AMERICAN CAR AND FOUNDRY COMPANY, NEW YORK • CHICAGO • ST. LOUIS • CLEVELAND • WASHINGTON  
PHILADELPHIA • SAN FRANCISCO • PITTSBURGH • HUNTINGTON, W. VIRGINIA • BERWICK, PENNSYLVANIA

# A.C.F.

## **MINE CARS**

*for Greater Mining Efficiency*

**DROP BOTTOM • END DUMP • ROTARY DUMP**

*Beats  
the  
Heat!*



## *New* **RUBBER-GLASS REPUBLIC CONVEYOR BELT**

Solving problems is our business.

For example, this new Republic belt carries hot cargo for foundries. Red-hot pieces of jagged metal in tons of smoldering sand ride from shake-out racks to reclaiming stations on this rubber-glass belt. Temperatures often run as high as 400°F. and the work is continuous.

Operations like this meant only trouble until Republic Rubber and its Milwaukee Distributor, Shadbolt & Boyd Company, entered the picture. Life expectancy of ordinary "hot material" belts was just ten weeks and sometimes less.

Today, the trouble is over. Republic's new belt made of glass fabric and specially compounded rubber is on the job and, after more than a full year of continuous service, the belt rolls on. It's

still pliable. The belt remains unbroken and good for a lot more service!

Success stories like this are common at Republic Rubber since we specialize in mechanical rubber goods only. An experienced Republic Distributor is located near you. Consult him or write us today about your most difficult problem. Remember, Republic Rubber has been *the* specialist in the mechanical rubber goods field for nearly fifty years!



Howard F. St. George, Vice Pres.  
Shadbolt & Boyd Company  
Milwaukee, Wis.



*Pioneers in the use of COLD RUBBER*

**REPUBLIC RUBBER DIVISION**  
LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN, OHIO  
Lee Deluxe Tires & Tubes • Conshohocken, Pa.

MECHANICAL RUBBER GOODS BY  
**REPUBLIC RUBBER  
DIVISION**

# Real Estate Sub-Division—400 Feet Down!



*Photographed in Southern Illinois coal fields by William Vandivert*

**Perhaps** you've never thought of a coal mine as a piece of real estate. But a glance at the map of a mine hung in this foreman's office underground makes clear the geographical similarity between a city area and the mine workings. It shows in detail every "street," railroad and passageway—covering several square miles *under the earth's surface*.

To the eye of the mining engineer, a map like this translates itself into a bigger investment in property than many a desirable residential section. It marks the expenditure of millions of dollars for railroad track, conveyor belt, timbering, and elevator and ventilating shafts.

All of this planning, construction and equipment is designed to produce coal efficiently, economically and in quantity enough to meet any demands. All of it represents a carefully calculated program of engineering and investment—running into billions of dollars—which assures everyone of coal easy to buy, efficient and economical to use.

**Aboveground, too,** modern mines represent a far cry from the "pick and shovel" days. To produce "prescription coals," free from loose impurities and blended and treated to meet customers' specifications, mine operators have built million-dollar preparation plants. Among new preparation plants now under construction is one designed to wash and grade coal at a record rate of 2,000 tons an hour. Modern coal mines employ almost as many skilled "miners" aboveground as below—and *all* receive the highest hourly wages paid by any major American industry.

## **BITUMINOUS COAL**

**BITUMINOUS COAL INSTITUTE**

A DEPARTMENT OF NATIONAL COAL ASSOCIATION

WASHINGTON, D. C.

**BITUMINOUS COAL . . . LIGHTS THE WAY . . . FUELS THE FIRES . . . POWERS THE PROGRESS OF AMERICA**

Why it pays to

*Call us*

when you

**need Alloy Steels**



**T**HERE are three major reasons why it's to your advantage to "Call Us" for all your alloy steel requirements:

1. You're sure that your orders will be filled quickly and efficiently.
2. You're sure of getting steels that are manufactured to a *Guaranteed Minimum Hardness*.
3. You get a *valuable metallurgical service*. This means that you get a Heat Treatment Guide with *each* shipment, containing specific data on the composition, potential physical properties and recommended heat treatment temperatures. This helps you get the maximum performance from the U-S-S Carilloy Steels supplied on your orders.

Yes, it pays you to "Call Us" when you need alloy steels. Our nearest warehouse or sales office is constantly at your service. So, phone, wire or write for prompt action. Meanwhile, your requests for literature will receive immediate attention. Just fill in and return the coupon. There's no obligation.



SYMBOL OF SERVICE

FOR STEEL USERS

United States Steel Supply Company  
Dept. A-129, 208 S. La Salle St., Chicago 4, Ill.  
Without obligation on our part, please send us **FREE**  
booklets on U-S-S Carilloy Steels.

Name ..... Title .....  
Firm Name .....  
Address .....  
City ..... Zone ..... State .....

**UNITED STATES STEEL SUPPLY COMPANY**

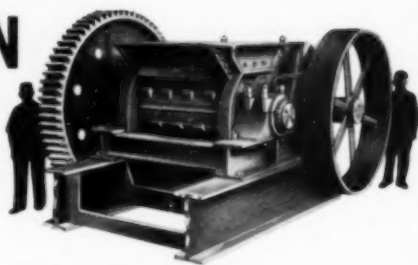


Warehouses: BALTIMORE • BOSTON • CHICAGO  
CLEVELAND • LOS ANGELES • MILWAUKEE • MOLINE, ILL. • NEWARK • PITTSBURGH  
PORTLAND, ORE. • SAN FRANCISCO • SEATTLE • ST. LOUIS • TWIN CITY (ST. PAUL)  
Also Sales Offices at: KANSAS CITY, MO. • PHILADELPHIA • TOLEDO • TULSA • YOUNGSTOWN  
Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

**UNITED STATES STEEL**

# \* MODERNIZATION

\* The difference between  
Profit and Loss in Today's  
Competitive Market

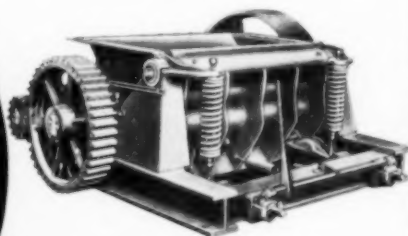


## Rockmaster Crushers

All Steel Constructed · Cast Steel Gears · Automatic Steelstrut toggle for Tramp Iron Protection · Chilled Alloy Iron or Steel, Interchangeable and Reversible Crushing Plate Liners on easily removable crushing plate · Heavy Split Bronze Bearings · Greatest Crushing Range with Opening Easily Adjustable

**McLANAHAN  
EQUIPMENT**

*is Rugged and Modern!*



## Black Diamond Crushers

guaranteed highest ton-per-dollar value!

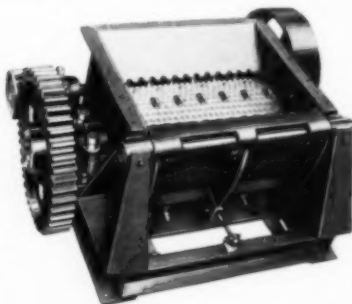
One piece, rigid, well proportioned steel frame, cut steel gears, split bronze bearings, V-belt drive and industrial type lubrication. Automatic tramp iron protection and quick adjustment.

Typical equipment  
McLanahan and Stone  
designs and builds:

- Heavy Duty Rock Crushers—Automatic Steelstrut Toggle, Quick Adjustment and Pioneer series
- Light Duty Single Rolls—Black Diamond and Bantam Buster in steel, semi-steel or fabricated frames
- Double Roll Fabricated Steel Crushers
- Jaw Crushers
- Portable and Semi-Portable Crushing Plants
- Dry Pans Super Heavy Duty
- Conveyors
- Dryers of Revolving Type
- Elevators
- Hoists
- Sand Drags
- Log Washers & Scrubbers
- Special Machinery and Complete Plants
- Feeders
- Ore Jigs
- Screens

## Bantam Buster Crushers

The McLanahan Bantam Buster Fabricated Steel frame crushers answer the need for a dependable, low cost machine that does the job with minimum operating and maintenance expenses. These rugged, high-ratio crushers take a larger feed than equivalent crushers. They easily crush different size feeds of hard and soft coal to various size products.



Headquarters for Pit, Mine and Quarry Modernization  
**McLANAHAN and STONE Corp.**

HOLLIDAYSBURG, PA.

Since 1835



# 22% MORE TON-MILES PER SHUTTLE CAR HOUR! WITH BATTERY-POWERED SHUTTLE CARS

Battery-powered shuttle cars have the following advantages demonstrated and proved:

## SAFETY

Only battery cars are "permissible"

## PRODUCTION

Can produce 10% more tonnage  
Deliver more tons per man shift  
Give 22% more ton-miles per shuttle car hour

## PERFORMANCE

Include all design advances  
Travel 25% faster  
Discharge 30% faster  
Are more dependable and predictable  
Handle supplies easier  
Reduce shuttle car change time  
Can gob underground  
Promote section efficiency

## COST

Equal capital cost  
Produce coal in shuttle car sections for approximately  $\frac{1}{3}$  less per ton\*\*  
—in hand-loaded sections, as much as 75¢ a ton

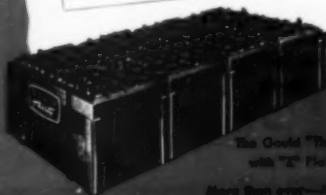
\*\*Shuttle Car Haulage, AIME, Technical Publication No. 2198.

## A "MUST" FOR CONTINUOUS MINING MACHINES

Battery-powered shuttle cars enable continuous mining machines to work 10% more of the shift.

## AND...

Two-shift operation is now possible with only one set of batteries.



The Gould "Terry"  
with "Z" Plates

More than ever—America's  
Proud Mining Battery

## Proved By 95 Time Studies

**THIS IS A FACT!** It is proved conclusively by figures available to everyone—figures from 95 published time studies made in mines from Pennsylvania to Illinois.\*

These 95 time studies reveal more down-in-earth, factual information about underground loading and haulage than has ever been available before! Now there is positive proof that battery-powered shuttle cars do 22% more work per shuttle car hour... travel 25% faster... discharge 30% faster... can produce 10% more tonnage!

These are just a few of the many facts brought to light by the extensive time studies. A full report on the safety, performance, production and economy of battery-powered shuttle cars, as revealed by these studies, is yours for the asking. You'll want to read it—you must read it to insure greatest economy for your operation! For your free copy of "A Report of Mine Shuttle Car Operation based on 95 Published Time Studies," write Dept. M-109.

\*Evaluation of Underground Loading and Haulage Methods, Mechanical, 1947.

# GOULD

## STORAGE BATTERY CORPORATION

TRENTON 7, NEW JERSEY

Always Use Gould Automobile and Truck Batteries



## When Internal Cable Failures "Sidetrack" Your Locomotives Switch to ROCKBESTOS A.V.C.



You lose more than top tonnage when locomotives are laid up by cable failure. Profits are *sidetracked* too—just because the internal wiring couldn't take the heat of resistor grids, overloads and other severe operating conditions.

One way to get the tonnage you *want* is to install the cable you *need*. Note these two "made-for-the-job" advantages of Rockbestos A.V.C.—especially important in keeping locomotives, cutters and loaders working full-time:

- (1) A braid that is highly resistant to heat, moisture, oil, grease and alkalis—one that won't burn or carry traveling wire-fires.
- (2) An age-resistant mineral insulation of felted asbestos that won't bake out or crack under heat and vibration—and won't ignite under an arc.

Wherever the going is hot or overloads are heavy, install Rockbestos A.V.C. for more tonnage, greater safety and reduced maintenance. Use it for motor leads, coil and grid connections. Write for a cut-back sample of the cable and a copy of Bulletin 30-C.

ROCKBESTOS PRODUCTS CORPORATION  
New Haven 4, Conn.

# ROCKBESTOS A.V.C.



The Cable with Permanent Insulation

**Construction Features  
of the Original  
ROCKBESTOS A.V.C.  
that mean Longer,  
Dependable Service**

Made to fit bushings properly.

Impregnated asbestos yarn braid is heatproof, flameproof and resistant to moisture, oil, grease and alkalis.

Felted asbestos insulation beneath, impregnated with heat, flame and moisture resisting compounds like the braid, won't bake out, crack, flow or burn.

Asbestos-protected varnished cambrie supplies high dielectric strength and added moisture resistance.

Inner impregnated asbestos insulating wall won't get brittle or crack under conductor-heating overloads and won't burn even if the copper melts.

Paper separator prevents insulation from sticking to the conductor, makes stripping easy.

*This construction is one of 125 developed by Rockbestos for severe operating conditions.*

ORDER FROM THESE JOBBERS—SPECIFY "ROCKBESTOS A.V.C."

BECKLEY, W. VA.: Beckley Mach. & Elec. Co.  
BIRMINGHAM, ALA.: Moore-Handley Howe Co.  
BLUEFIELD, W. VA.: Superior-Sterling Co.  
CHARLESTON, W. VA.: Charleston Elec. Supply Co.  
CLEVELAND, OHIO: Upson-Walton Co.

EVANSVILLE, IND.: FAIRMONT, W. VA.:  
HUNTINGTON, W. VA.:  
LOTHAIR, KY.:  
MIDDLESBORO, KY.:

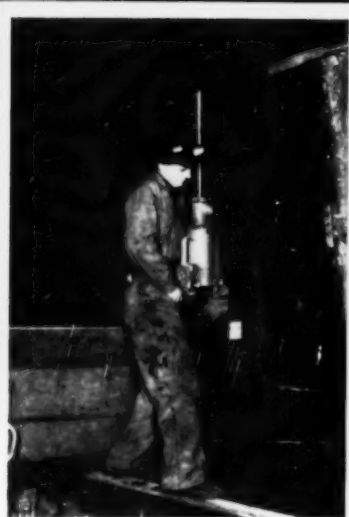
Evanoville Elec. & Mfg. Co.  
Fairmont Supply Co.  
Banks-Miller Supply Co.  
Mine Service Co.  
Rogan & Rogan Co.

PITTSBURGH, PA.:  
SCRANTON, PA.:  
WHEELING, W. VA.:  
WILLIAMSON, W. VA.:

Upson-Walton Co.  
Westinghouse Elec. Supply Co.  
Penn. Elec. Engineering Co.  
Westinghouse Elec. Supply Co.  
Williamson Supply Co.



**IN HARD OR SOFT COAL—**



# JOY SAFETY DRILLS



*A complete balance of rotation forces means JOY Safety Drills are safer and easier to handle, more efficient. They'll save time and cut costs for you, no matter what your drilling conditions are.*

are UNMATCHED for

- ★ **SPEED**      ★ **PROTECTION**
- ★ **EFFICIENCY**      ★ **SERVICE**
- ★ **EASE OF HANDLING**

Write for Bulletin, or

*Consult a Joy Engineer*



## JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

# JOY

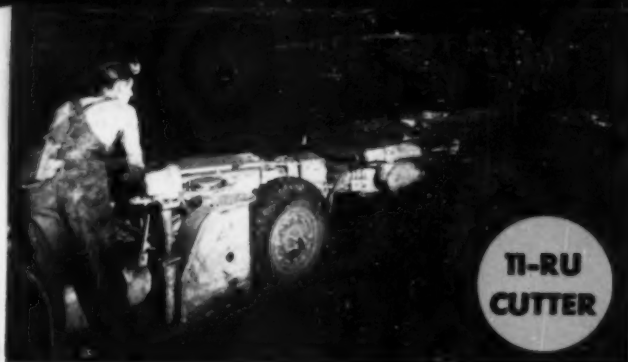
## EQUIPMENT

*Field-Proved for*

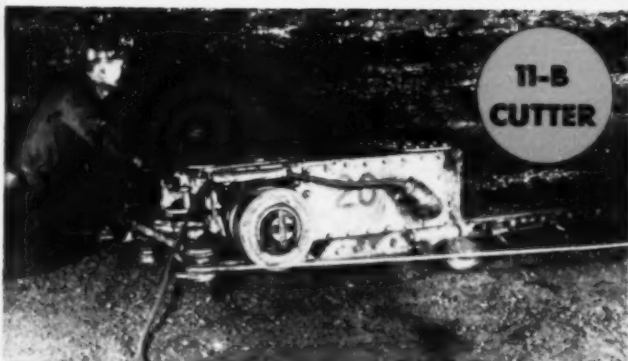
## THIN SEAMS



12-BU  
LOADER



TI-RU  
CUTTER



TI-B  
CUTTER



15"  
CHAIN  
CONVEYOR

- ★ ***WORKS FASTER!***
- ★ ***LOADS MORE COAL  
at LESS COST!***
- ★ ***LASTS LONGER!***

Write for Bulletins, or *Consult a Joy Engineer*

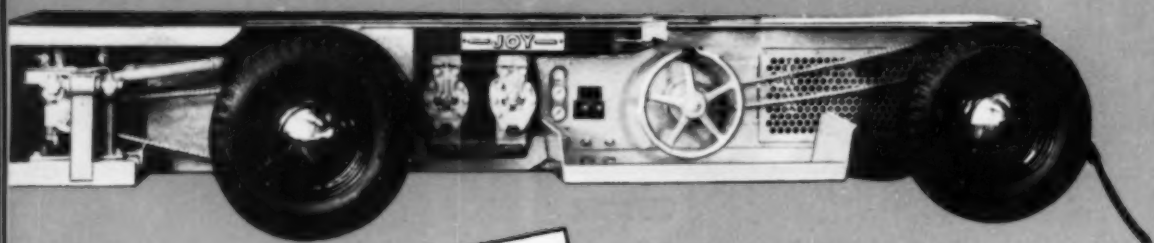
W50CL 203R

**JOY MANUFACTURING COMPANY**

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**TYPE WK-83 . . . TRACKLESS  
SELF-PROPELLED—30" TO 34" HIGH**

*JOY MINE-AIR COMPRESSORS are available in rubber-tire and track models, either self-propelled or draw-bar types, and in permissible units. Compressors are highly efficient, two-stage, single-acting, air-cooled—built in 130, 173, or 240 CFM sizes.*

# JOY

## MINE-AIR COMPRESSORS AND DRILLS

*DO YOUR ROOF-BOLTING JOB  
BEST and FASTEST!*



**You can drill your holes in low  
coal with fewer steel changes**

**JOY Roof-Bolting Equipment is not  
only field-proved . . . it's backed  
by 50 years of compressor and  
drill-building experience.**

*JOY STOPER DRILLS include a complete  
range of sizes down to 21" high. They do the entire roof  
bolting job: drill the hole, drive the bolt and wedge, and  
tighten the nut with an exclusive built-in torque wrench.  
They're the only drills that can drill the maximum roof  
hole in a 36" or thinner seam with fewer steel changes.*

**Write for Bulletins, or**

*Consult a Joy Engineer*

# JOY MANUFACTURING COMPANY

**GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.**

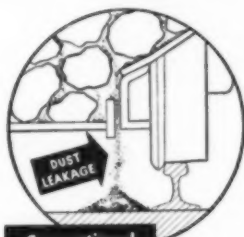
**IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO**







## You'll Need These Five Savings In 1950!



Conventional  
Automatic



S-D's New Sealed  
Automatic Design

**1—SPEED**—S-D "Automatics" can discharge coal at the tippie at the rate of more than 2 cars a minute!

**2—AUTOMATIC DUMPING**—Our automatic "Jerk-Out" unlatching device does away with all labor at tippie. Each car automatically discharges its load . . . dumping on the move, and can fill the bin level full!

**3—LOW MAINTENANCE**—S-D "Automatics" lead an easy life because they are not subjected to the strains incident to being lifted or turned over for dumping.

**4—NO COAL BREAKAGE**—Coal is not dropped—it is laid down gently, through one door at a time. Coal breakage is reduced to the absolute minimum.

**5—NO TRACK CLEAN-UP**—Now, S-D "Automatics" are completely SEALED . . . Safety Sealed! Because of a Dust-Roof seal over space between doors and frame, and with a new patented sealed hood over wheels, coal dust cannot sift down onto tracks . . . a feature that, in itself, can save operators thousands of dollars annually in track clean-up costs.

*20 Car loads of "Automatics" from—*

**SANFORD-DAY IRON WORKS, Inc. Knoxville 9, Tenn.**



## HOW MANY TONS does bad weather cost you?

If your pit-to-plant hauling slows down or stops during heavy rains, snows, freezing, thaws and other adverse conditions . . . you are being "taxed" heavily in lost tonnage and idle equipment each year.



**IS THERE A REMEDY?** Yes . . . haul with Walter Tractor Trucks and enjoy "weatherproof" hauling. You get the economy of hauling 20-30-40 ton payloads, in any weather, in any season, on or off the road.

This is possible only with the Walter Four-Point Positive Drive, which provides 100% positive traction in all four driving wheels—two front, two rear. There is no wheel-spinning, slipping, or

stalling in soft mud, dirt, sand, ice, slippery surfaces or grades.

Learn more about big, powerful, rugged, maneuverable Walter Tractor Trucks for open pit mine hauling. Have a hauling engineer call—or write for detailed literature.

**WALTER**  
4-POINT POSITIVE DRIVE  
**TRACTOR TRUCKS**

Above: 300 hp. Walter Tractor Truck with 30-ton bottom dump coal trailer.

Right: 200 hp. Walter Tractor Truck with 20 cu. yd. back dump body.



WALTER MOTOR TRUCK COMPANY, 1001-19 IRVING AVE., RIDGEWOOD 27, QUEENS, L. I., N. Y.

# Specify Thermoid



## New Air Hose For Mine Service

From Thermoid's planned program of product development and improvement—a new air hose for mine use. Specifically designed for this exacting requirement—field proven in actual operation—it offers the maximum in trouble-free service. Heavy synthetic rubber oil-proof tube—rayon cord reinforcement for greatest strength and flexibility—smooth extra heavy rubber cover for maximum resistance to abrasion and cutting from sharp rocks.

Mandrel-built to assure uniform inside diameters. All sizes from  $\frac{1}{4}$ " to  $1\frac{1}{2}$ " inclusive in 50' lengths. Available from your nearest Thermoid distributor or if you prefer write us for additional information.

It will pay you to *Specify* Thermoid!

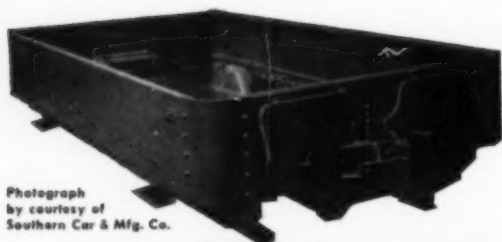
*Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.*

### The Thermoid Impregnation Process

insures a deeper penetration of rubber between the threads of the yarn, which encases each individual strand with protective rubber. The rubber acts as a sheath between the strands and prevents the destructive abrasive action as the product is flexed in use. To obtain the required rubber penetration, the twist of the yarn must be to exact specifications. With the yarn twisted too tightly, proper penetration of the rubber compound is impossible. This condition produces abrasion, causing premature failure. On the other hand, if the yarn is twisted too loosely, the product lacks tensile strength. Thermoid has discovered the optimum twist of the yarn which assures maximum rubber penetration and greatest strength. The development of Thermoid Impregnation Process is another step forward in Thermoid's planned program of product improvement, assuring maximum service and lower operating costs to industry through the use of Thermoid Industrial Rubber Products.

**Thermoid**  
Company

Main Offices and Factory • Trenton, N. J., U. S. A.  
Western Offices and Factory • Nephi, Utah, U. S. A.  
Industrial Rubber Products • Friction Materials • Oil Field Products



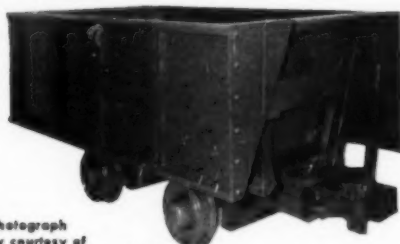
Photograph  
by courtesy of  
Southern Car & Mfg. Co.



Photograph  
by courtesy of  
Warr Car & Wheel Co.



FOR  
*Small Cars*  
OR  
*Big Ones*



Photograph  
by courtesy of  
Lake Shore Engineering Co.

## WILLISON *automatic* COUPLERS!

Size of car makes no difference in the working advantages of Willison Automatic Couplers. For large cars or small ones, they give you maximum safety, faster handling and lower maintenance cost.

**Safety**—Willison Automatic Couplers can be operated entirely from the side of the car, eliminating necessity of worker going between cars.

**Speed**—Completely automatic operation speeds up coupling—greatly facilitates gathering and shunting. Willison Couplers are always ready to couple, operating just as readily when cars are reversed in position.

**Long Life**—Stresses of draft and buffing are received directly by coupler body without interposition of any moving part. Two essential parts, the head and the lock, do the work. Sturdy construction results in greatly reduced coupler and car maintenance.

These advantages of Willison Automatic Couplers have been proved for over twenty years by leading mine operators. We are ready to work with you or your car-builders in the selection of Willison Automatic Couplers for your mine or industrial cars.

Write for Circular No. 5240

**NATIONAL MALLEABLE AND  
STEEL CASTINGS COMPANY**

*Cleveland, Ohio*

**NATIONAL**

*Products*

FOR TRANSPORTATION  
AND INDUSTRY



Est.

1888



This powerful, high-speed locomotive, designed for long gathering-points-to-tipple runs, gets loaded cars out, empties back in, at new time- and money-saving speeds.

## NEW 30-TON GENERAL ELECTRIC MINE HAULAGE LOCOMOTIVE

# MOVES MOUNTAINS *Safely*

If you want to move mountains of coal quickly, inexpensively, and safely, here's the unit for you.

### IT HAS POWER . . .

up to 18,000 lbs maximum drawbar pull

### IT HAS SPEED . . .

up to 35 mph maximum permissible speed

And it's good sense that a unit which operates with less strain on track and equipment gives maximum assurance against mishap to personnel and equipment.

Here are a few of the safety features of this unit:

**WEIGHT IS DISTRIBUTED** over four axles to reduce concentrated load and lateral force on tracks.

**SHORT, RIGID WHEELBASE**, low inertia, and swivel connections of trucks permit wheels to follow rails freely, without binding or straining.

**SHORT OVERHANG** at ends prevents teetering or galloping, promotes smooth riding.

Call in a G-E mine locomotive specialist for detailed discussion of all your haulage problems. Meantime, write for bulletin GEA-4774A. Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

FOR SAFER SERVICE . . . G-E MINE LOCOMOTIVES

GENERAL  ELECTRIC

# 4 Wheel Drive PAYLOADER

**PROFITMAKER  
AT MINE  
AND TIPPLE**

**PROOF** is in **PERFORMANCE!** Already the Model HM PAYLOADER is a formidable tool in the coal mining industry. Proven is its power, versatility and ability to speed-up stripping and loading operations in all kinds of weather and over varying ground conditions.

Upon four wheel drive and large earthmover tires is based the secret of this machine's tremendous traction and flotation. Its power-boosted rear wheel steering, 4 speeds in each direction and quick-acting forward-reverse control accounts for its unusual maneuvering speed. The Model HM travels *anywhere* and can dig, strip, load, carry or grade. It is used in the construction and maintenance of haul roads, works in borrow pits and serves as a practical utility unit. Its large pneumatic tires do not fracture or waste coal exposed in the vein!

This completely new and different tractor shovel is equipped with a  $1\frac{1}{2}$  yard bucket and is available with 76 HP gasoline or diesel power. Bulldozer Blade and Crane Hook attachments are quickly interchangeable with the bucket. Get the complete story on this efficient new PAYLOADER from your Hough Distributor or write The Frank G. Hough Co., 735 Sunnyside Avenue, Libertyville, Illinois.

WRITE for full information on any size of PAYLOADER, the  $1\frac{1}{2}$  yd. Model HM, the  $1\frac{1}{4}$  yd. Model HL, the  $\frac{3}{4}$  yd. Model HF, the  $10\frac{1}{2}$  cu. ft. Model HA.



## PAYLOADER

Manufactured by THE FRANK G. HOUGH CO.



### POSITIVE TRACTION AT ALL TIMES WITH 4 WHEEL DRIVE AND LARGE EARTHMOVER TIRES

**UPHILL REVERSE** Front wheels provide greater amount of traction.



**UPHILL FORWARD** Rear wheels provide greater amount of traction.



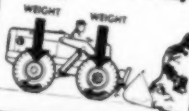
**MUD** All wheels provide traction.



**SAND** All wheels provide traction.



**CROWDING** More traction on rear wheels when thrusting into pile.



**SCOOPING** More traction at front when scooping up load.







# ENGINEERING

**MAKING *One Dollar***  
**DO THE WORK OF TWO . . .**



A&G experience, when consulted and put to work to achieve a determined modernization objective, accomplishes two things: (1) It saves the expenditure of excessive dollars; (2) The goal you set is not only reached but you are equipped for continuous cost-saving production.

A&G's 38 years in business spans the entire development period of mining and preparing coal by mechanical methods. This well-grounded and thorough experience in engineering, designing, and construction gives you every benefit that only such sound seasoning can produce.

A&G cuts no corners nor hides any costs — every detail of our work is complete. Ours is a commission plan of compensation and we perform on a time and material basis.

We are ready to discuss your situation with you when you can conveniently do so. You are not obligated in any way.

Our services are rendered on a time and material basis — you are given a definite breakdown of every item that goes into your mine.

We are not limited in service to those companies whose tonnages run into the millions. Many of our assignments have been for producers of smaller tonnages.

## SCOPE OF SERVICES

- Design and construction of new plants and their various units.
- Organization, operation, and management of mines.
- Below ground modernization and mechanization.
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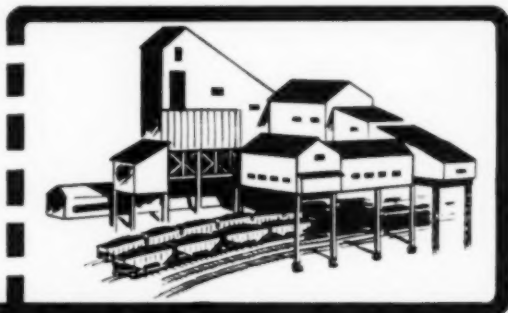
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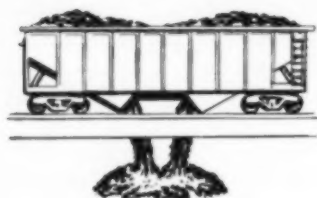
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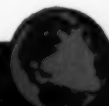
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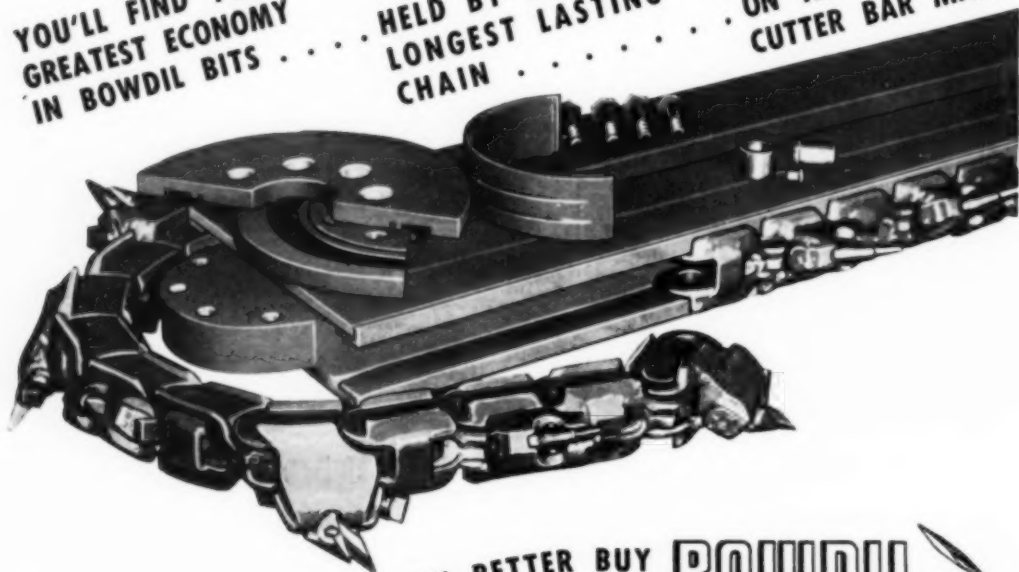
# Ideas to lower costs:

New wage agreements, pension plans and other things that are happening today have increased the importance of finding ways to cut costs. In every industry, coal included, management men are testing new, different ideas that will offset rising costs, and perform the same or better job or operation at LOWER cost.

In the automotive industry for example, one plant reports saving one million dollars a year by changing to cheaper tote containers. In another firm, canvas gloves that lasted one day were replaced with synthetic impregnated gloves that last three days — at a saving of \$71,000 yearly. Another company now saves \$1 per car with a simplified ignition switch.

Many mine operators are conducting tests on all ideas that look practical, and to those who are seeking to cut costs as they cut coal, Bowdill offers complete cooperation. We are interested in helping you get more for your money and believe that down where your profit begins is the best place to start.

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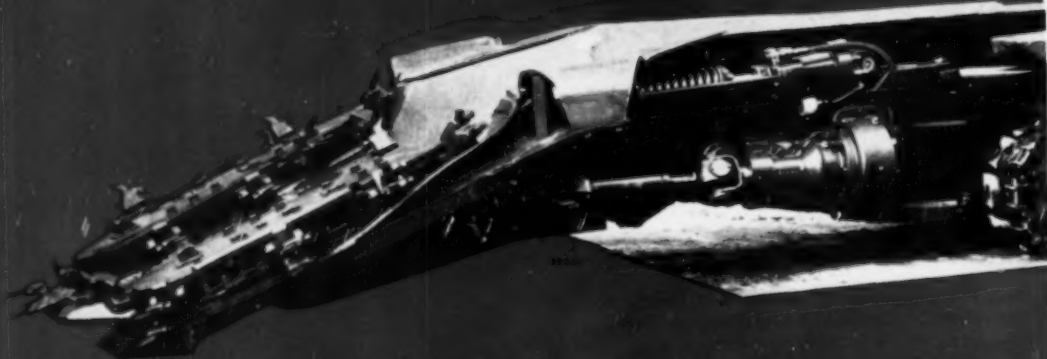
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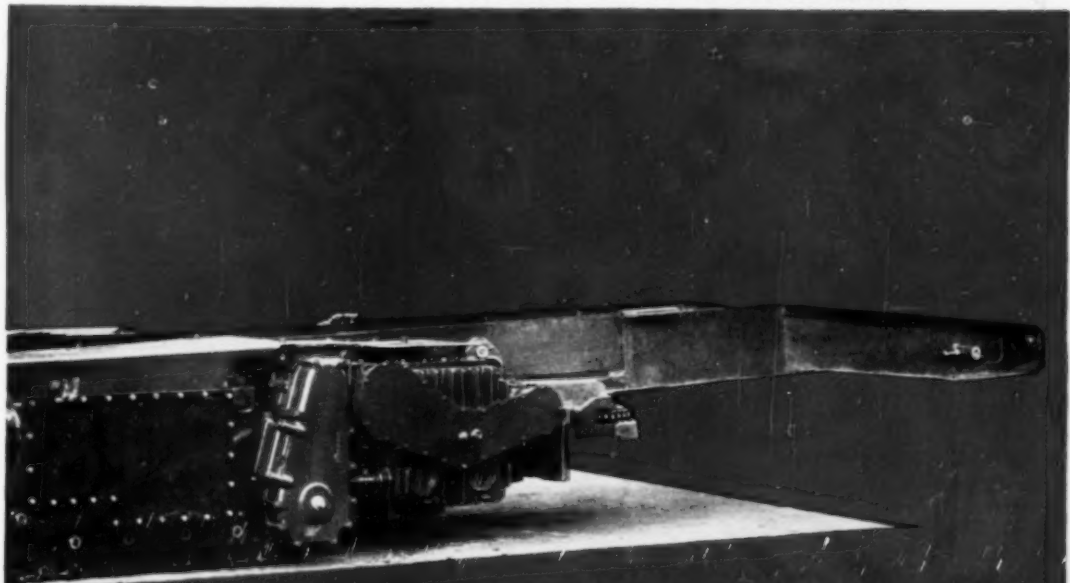


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DECEMBER, 1949

IVAN A. GIVEN, EDITOR

## End and Beginning

SIGNS MULTIPLIED in November that 1949 could well mark the turn in the coal industry's relations with its employees. True, prophecy where Mr. Lewis is involved is hedged with more than the usual pitfalls. But it is becoming increasingly evident that things were slightly different in 1949. For instance, Mr. Lewis has declared truces before for tactical purposes, but then it was a matter of whether he wanted to or not. This year, the element of free choice was significantly reduced, and there is good reason to believe that this resulted from growing public and mineworker appreciation of the real nature of the monopoly power he wields and decreasing sympathy with his methods.

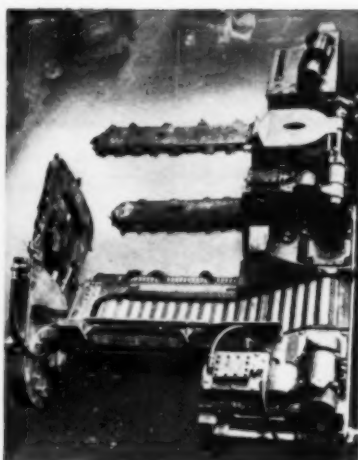
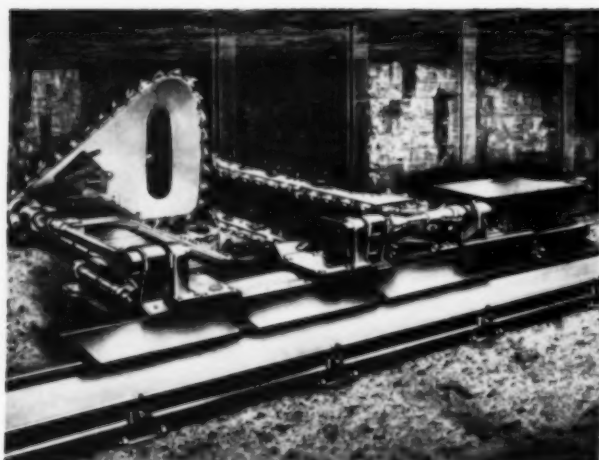
Perhaps this conclusion is less true of the miners, but if they are not becoming educated they have had, in 1949, a real taste of what arbitrary action can mean in reduced earnings—this at a time when wage rates were at the highest level in history and it was plainly evident that there was plenty of work. With a less-favorable public attitude and miner discontent on the increase, Lewis was more forced than not in declaring his November truce.

The turn—if such it is—has been long overdue. And, if turn it is, it will have been brought about by the determined stand of the bituminous operators. Taking that stand was a serious step, involving, as it eventually did, preparedness to make perhaps the ultimate sacrifice—that of seeing the mines go into the hands of the government and thereby running the risk of permanent loss. But that was a risk that had to be taken, not only for the good of the industry and its employees but also for the benefit of the country as a whole. Arbitrary and excessive use of monopoly power already has confronted the industry with real difficulties, and it may be that even 1949 will not see it completely curbed. But the attempt had to be

made to prevent further weakening of the industry's competitive power by reducing its ability to render stable, low-cost service. Otherwise, the inevitable results could be nothing but harder times for investors and employees as a result of further market losses. Even more important, the nation would be deprived of the benefits in security and service inherent in a healthy and progressive mining industry.

In short, while the price of a return to order and stability in employee relations, with full consideration of the interests of all, including the consumers, already has been substantial and is yet to be met in full, it is cheaper than the cost of permitting monopoly power to continue unchecked. Oil and natural gas have again publicly thanked Mr. Lewis for his sales job in their behalf, although the returns are not all in yet. And when they are in, it may turn out that coal got off without losing too much hide and may enjoy a better opportunity for solidifying its position, especially since it now appears that gas and oil will devote part of their efforts to battling each other rather than concentrating on coal.

If 1949 marks the end of one era and the beginning of another in employee and union relations, it will be a result of the firm stand taken by the operators and their persistence in maintaining their case through three-day work weeks, no-day work weeks and weary months of trying to persuade union representatives to sit down and really bargain on the facts. Whatever the details of the final settlements may be, 1949 has proved to the hilt the value of presenting a firm and unbroken front. Coupled with a sincere desire to reach agreements in tune with the realities and be fair to both sides, this should go far toward building the genuine miner-operator cooperation so necessary for maximum progress in the future.



BRITISH CUTTER-LOADER, A. B. Meco-Moore, mining 500 tpd, can work in either direction across the face.

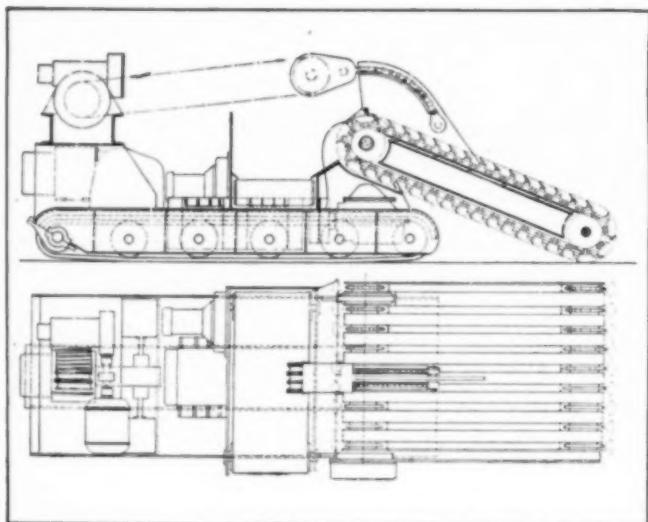
## Mining Machinery Abroad

Need for Lower Cost and More Coal Spur Design of New Machines in Great Britain and Europe—Combined Cutter-Loaders Appear in Britain, Germany, Hungary and Russia — More Diesel Locomotives Underground

MINING ENGINEERS and machine designers in all major coal-producing countries around the world are looking for new mining machines and equipment to cut coal costs and increase tonnage. That is true here in the United States where, within the past year, the Joy miner and the Colmol have been introduced and the basic design of other mining-and-loading machines are being worked out by research and mining-development manufacturing organizations.

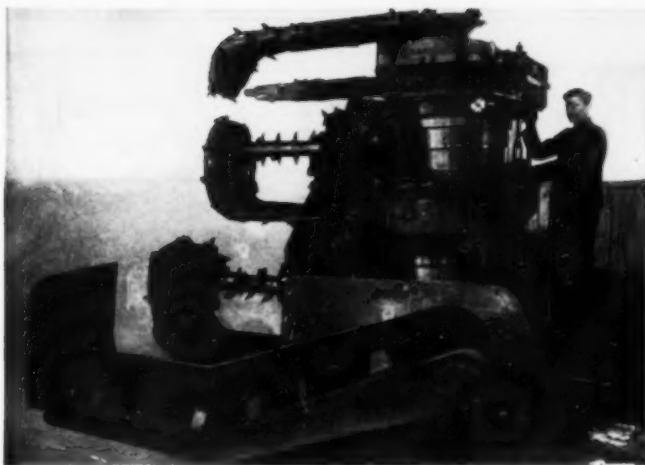
These developments in our own country bid fair to help coal where it needs most help—cutting costs where they are most vulnerable by boosting tons per man-day. With labor taking about 60¢ out of each dollar a coal company gets for its product, doubling production per man-day in bituminous could knock off as much as \$1.50 per ton; in anthracite, about \$2.60. Savings of this order could shore up coal's strength for the competitive struggle with oil and natural gas.

In Britain and Europe also, cost-cutting is a strong incentive for building new-type machines and equipment. There, however, the factor of desperate need provides a still sharper incentive. With factories wrecked by war, and heavy and consumer-goods industries slowed down to a snail's pace, more coal is the starting point for British and European recovery.



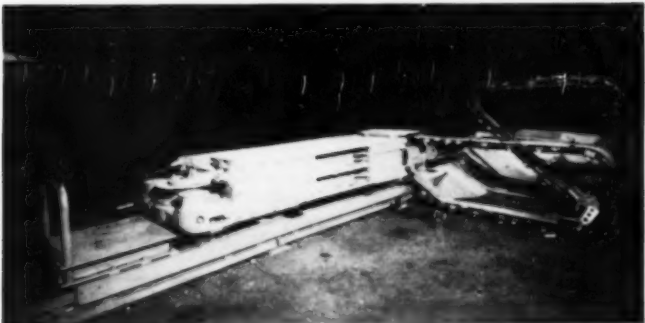
*Hungarian Journal of Mining & Metallurgy*

HUNGARIAN CUTTER-LOADER, Petofi model, still is in design stage. Mining head sumps in at floor and sweeps up the face. Crew totals 14 men.

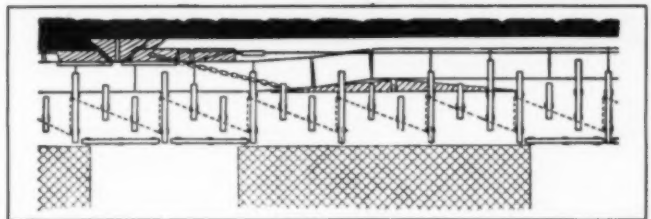
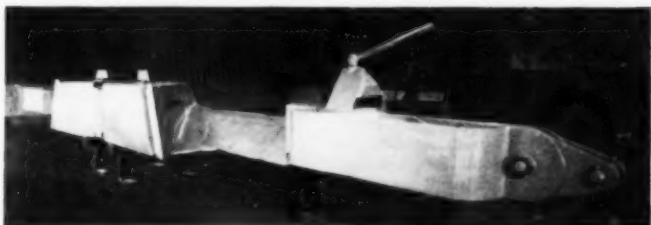


RUSSIAN COMBINE has cutter bars and disks, tearing bars and loader.

*Socfoto*



GERMAN CUTTER-LOADER, Cuylen model, cuts at five different angles. Machine travels on top of chain conveyor, into which coal is loaded directly.



GERMAN COAL PLOVER, hauled across face by rope, is reversible. Sledge dragged behind plow forces conveyor toward face.

*Verlag Glückauf*

The fact that coal men nearly everywhere have taken on the job of building new machines and equipment is a measure of coal's indispensability as a provider of energy. Their successes thus far are a measure of the skill and vision of the industry's leaders.

In the following paragraphs, some of the new developments abroad, either in use or under test, are described briefly. They fall under the following headings: cutting and breaking down coal, combination cutter-loaders, the coal plow, tunnel drivers, and ancillary equipment, including conveyors, drills and haulage units.

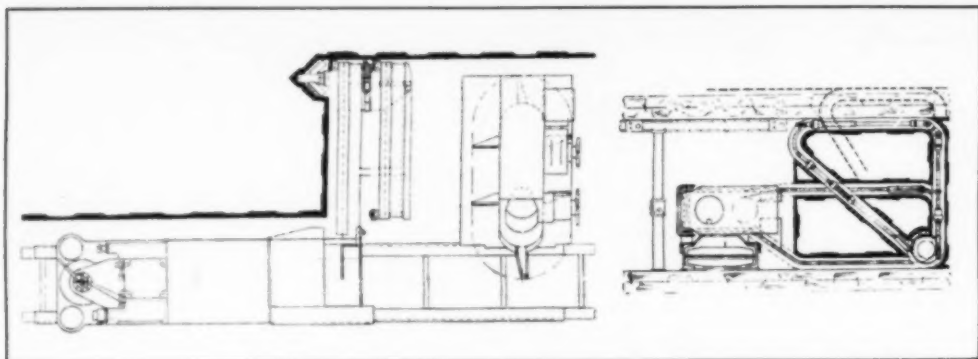
## Cutting and Breaking Coal

**Germany**—The Germans probably have designed more unconventional cutting elements and combinations of cutting elements than anybody else unless it is the Russians, who do not tell much about what they are doing but boast about big strides. To meet various mining conditions and to mine various types of coal, the Germans have rigged cutting units with double bars, upturned bars, downturned bars, slanting bars, shearers that slice behind the face, rectangular and triangular cutting frames and combinations of two or more of the above.

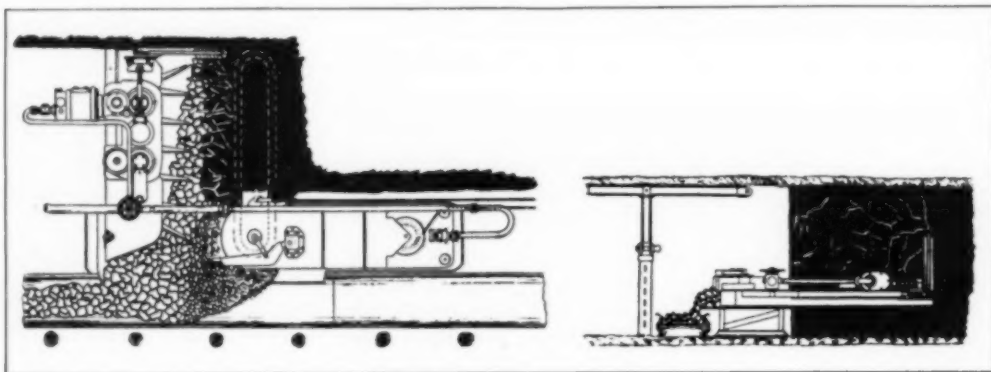
However, the Korfman SK-20 universal shearing machine appears to mark a substantial advance over previous German cutters of more conventional design. The cutter guide frame is suspended on a sliding or threaded spindle for height adjustment and the cutter bar may be rotated for shearing or cutting. Driven either by compressed air or by a 9½-kw motor, the Korfman cuts a 3½-in kerf with a 7-position chain carrying from 36 to 53 bits, depending on the hardness of the coal. Chain speed is 8 fps.

**Britain**—The British also have made use of some unconventional cutter bars, mostly in connection with combination cutter-loaders. However, the most interesting British development for breaking coal off the face, after it has been cut or sheared, is the Gullick "Coalbuster," which operates hydraulically. To use the Coalbuster, crewmen drill holes in the coal as if for conventional explosives. A round stainless-steel bar 2¼ in in diameter and cham-

## Foreign Mining Machines Aim at Bigger Tonnage and Higher Efficiency



CUYLEN MACHINE has two cutter frames and floor-level boring head. Paddle-wheels shove coal up on conveyor. *Colliery Engineering*



DEMAG MACHINE has horizontal cutter and vertical shearing frame. Face conveyor lies between machine and posts. *Bergbau Archiv*

bered at intervals to accommodate telescopic pistons, is inserted in the drill hole. When the bar is in place, the pistons are forced outward against the coal by water pumped in under pressure. Breaking a hole takes about 25 sec and  $1\frac{1}{2}$  pt of water. A single water pump operates several Coalbursters working in a longwall face. The slow thrusting action of the water-driven pistons replaces the swift concussive action of explosives, eliminating dust and increasing the percentage of larger sizes.

### Combination Cutter-Loaders

British and European mining men have designed several mining-and-loading machines—that is, machines which, without drilling or shooting, break coal off the solid and load it directly into a conveyor or other transportation unit with a

minimum of interruption. Interruptions, when they occur, are for the purpose of tramping the machine back to its starting point, reversing the cutting and loading elements, moving the conveyor up to the face, or moving the machines feeding trough forward from one gap between timbers to the next gap as the machine advances.

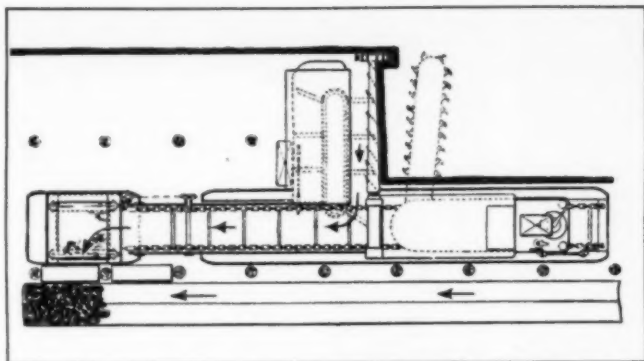
Without exception, the machines are designed for longwall or semi-longwall mining and require a stall or stable at one or both ends of the face to permit the machine to sump in and to accommodate the winches and pulleys needed for drawing the machine along the face.

**Britain**—Since the installation of a prototype machine early in 1948, British sources have said little about the performance of the Logan slab cutter beyond reporting that it has worked across a 270-ft face in a  $4\frac{1}{2}$ -ft seam in 110 min. The machine is built with four cutting elements: a bottom cutter, which makes a 6-in kerf; a middle

or top cutter,  $3\frac{1}{2}$ -in kerf; a triangular-frame shearing cutter,  $4\frac{1}{2}$ -in kerf; and a severing cutter,  $3\frac{1}{2}$ -in kerf.

Except for the shearing cutter, all bars are pivoted at the base and, after sumping in, cut in a 90-deg arc. The severing cutter is used only if the coal does not fall down of its own weight after the other three cutters have worked through the vein. The height of the shearing cutter is tailor-made to fit the thickness of the particular seam being worked. An interlock between the severing cutter and the feed gear is arranged to stop the forward movement of the machine while the severing cut, if needed, is made.

Depth of cut from old face to new face is  $28\frac{1}{2}$  in. The machine is pulled across the face by a rope and drum, feed being variable from 9 to 54 in per minute. The same rope and drum are used for tramping back across the face, since the machine is not reversible.



EICKHOFF MACHINE'S loading element shoves coal to built-in chain conveyor.

The 6-in kerf made by the bottom cutter allows the loading nose, located just behind the cutting elements, to get well under the coal. A chain-type conveyor elevates the coal from the loading nose, turning near the top of the flight so that the coal flows down a steel trough onto the face conveyor, which is laid alongside the machine parallel to the face. Cuttings are removed by two chain-type paddle gatherers moving across the width of the machine. The paddles of the bottom gatherer scrape along the floor and discharge the cuttings into the side gatherer, which elevates and discharges them onto the face conveyor through a chute.

Driven by a 70-hp motor, the Logan machine is 12 ft long and 44½ in wide.

The Meco-Moore cutter-loader is available in two models, the smaller of which is designed for seams down to 3 ft in thickness. The major structural difference between the thin- and the thick-seam models is that the two 60-hp motors of the thin-seam model are arranged side by side instead of one above the other, as in the thick-seam model. One of the motors drives the two horizontal cutter bars, the other the shearing cutter and the loading unit. The height of the upper cutter bar may be varied down to a minimum of 2 ft 1 in.

The cutter and shearer-loader components of the Meco-Moore machine are linked by a hinged coupling. Thus the two components can be transposed at the end of a cut and the machine can work its way back in the opposite direction, mining coal as it goes. Speed of advance across the face normally is 27 to 30 in per minute.

The two horizontal cuts and the

shearing cut, plus roof pressure, cause the coal to break down and fall into the loader well or onto the floor. As the machine advances, a loader bar tosses the floor coal into the well. A transverse belt carries the coal across the machine and discharges it onto the face conveyor, which is laid up close to the face props.

Length of the Meco-Moore combine is 16¾ ft; width, 3 ft 1 in; height of shearing frame, 2½ to 6½ ft; width of cut, 5½, 5 or 4½ ft.

**Germany**—The Eickhoff cutter-loader, designed primarily for fairly thick seams, uses a single 40- to 50-hp motor to drive cutting and loading elements. The basic design, comprising two horizontal cutting bars followed by a loading element, is modified in several ways, as follows:

1. The top cutter bar is fitted with a shearing disk 20 in in diameter, height of the cutter bar and disk being controlled by a hydraulic system. The loading component is a flight conveyor which moves the coal sideways onto a chain conveyor laid parallel to the long axis of the machine. The chain conveyor in turn lifts the coal onto a cross-band conveyor which delivers it between the props to the longwall face conveyor. A scraper conveyor passes underneath the cutter chain to clear out cuttings.

2. The Rheinpreussen model loads the coal onto an underbelt chain conveyor running on the same track as the machine. The underbelt, threaded through the machine structure, is, in fact, the longwall face conveyor. It receives coal directly from the loader and thus eliminates the need for feeding coal

through the props to a conveyor laid outside the props. The Rheinpreussen model is reported to leave a good deal of coal on the floor and pneumatic-pick operators sometimes are needed to break down overhanging coal. Rate of travel is said to be about 48 ft per hour in a 6½-ft seam of friable coal.

3. The Bergbau-Verein model, which enables two machines to work in tandem with a single face conveyor, calls for a telescopic endless belt immediately behind the machines. This belt discharges the coal between the props onto the face conveyor by means of a short cross conveyor, which is moved forward periodically as the machine advances. A further modification of the Bergbau-Verein model employs a spiral bugduster to remove fines from the undercut and a larger spiral to convey the main body of coal upward and sideways to a ramp, whence it is discharged between the props to a face conveyor.

The Demag cutter-loader is designed for thinner seams than the Eickhoff. It consists of a 40-hp cutting assembly 16 in high and a loading unit driven by a 20-hp motor. The cutting elements are a horizontal bar and a vertical shearing frame, the latter shearing the face off the solid parallel to the long axis of the machine. Loading arms following behind push the coal up a ramp and onto an underbelt conveyor. A flap bugduster fitted to the horizontal cutter bar pushes the fines toward the face belt on the forward stroke and folds up on the return stroke.

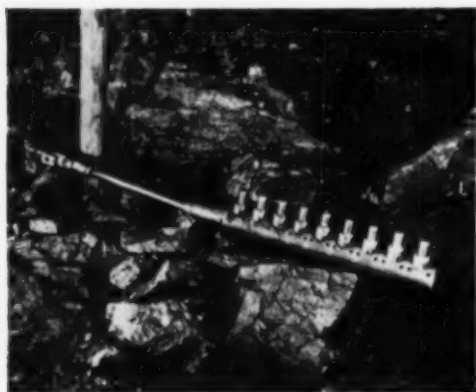
The machine can work in only one direction and must tram back to the far end of the face after completing a cut. Forepoling permits the face conveyor to lie between the machine and the first row of props. Rate of advance ranges from 80 to 100 ft per hour. In one shift, the machine is reported to have mined 230 tons, traveling 400 ft in a 3-ft 3-in seam.

The Cuylen cutter-loader, comprising two frame cutters and a loading unit, is said to have mined from 380 to 400 tons per shift from a 550-ft face. The forward cutting frame, the lower of the two, makes a rectangular cut, the upper kerf being about halfway the height of the seam and the lower cut close to the floor, with a shear cut at the back.

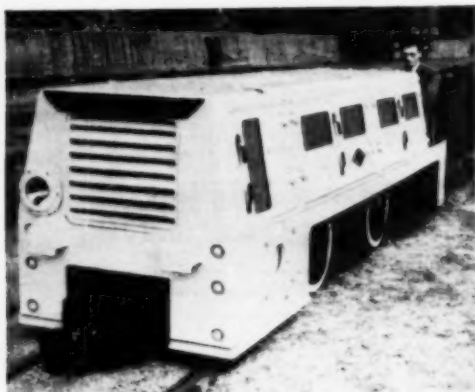
The rectangular frame is followed by a right-triangle frame, the right angle positioned uppermost and farthest from the machine. The



## Foreign Breaking and Haulage Equipment Boosts Quality and Output



BRITISH "COALBURSTER" is used in drill holes. Water pressure forces small steel pistons outward, breaking coal gently.



DIESEL LOCOMOTIVES are used widely in British and European mines. Built-in safeguards keep air clean and avoid explosions.

triangular frame makes the horizontal roof cut, extends the back shear cut upward and makes a diagonal cut, if any coal is left in its path. In one modification of the Cuylen machine, small chipping heads are used in the upper face-side corners of both frames and a large-size boring head digs into the coal ahead on the lower face-side corner of the rectangular frame.

The loading component of the Cuylen cutter-loader, following behind the cutting frames, scrapes up the fallen coal as the machine moves forward. An endless chain of paddlewheels shoves the coal onto a built-in transverse conveyor discharging onto an underbelt conveyor, which is built into the steel track along which the machine moves.

**Russia**—Although technical and operating details are withheld, as usual, it is known that the Russians have designed and built several types of longwall cutter-loaders which are said to have boosted output per man 50 to 100%.

Probably the best-known of the Russian combines is the Makarov, named for its designer. A mammoth machine, as shown in available photographs, it obviously is designed for thick seams in the range of 8 ft or more. Four cutter bars, three of which are bent either upward or downward at the end for shearing, two rotating shafts fitted with heavy spikes for tearing the coal down and a shearing disk are the major mining elements. Loading is done by means of a flat pan trailing the cutters at floor level. The forward movement of the machine forces the coal onto the pan, where it is picked up by a trans-

verse conveyor and discharged to the face conveyor.

For thinner seams down to about 4 ft, the Abbakumov consists only of a straight undercutter and a tearing bar. The latter is a straight shaft fitted with heavy spikes and two shearing disks, one at the outside end of the bar and the other about midway its length. Depth of the cut taken from the face appears to be about 40 in. Sheaves pictured on the machine indicate that it is hauled along the face by a rope-and-pulley system. The loading element is not visible in available photographs.

Other Russian combines reported but not described are the GUK machine, made especially for inclined seams 2½ to 4 ft thick; the VOM machine, for seams 5 to 10 ft thick; and an unnamed machine which is reported to work a 300-ft face, cutting and loading 20 tons in less than 25 minutes.

**Hungary**—The Schmidt continuous miner, designed in 1943 and field tested in 1944, failed because (1) the sizes of coal produced were too small, (2) it was not properly designed for brown coal and lignite, (3) the rear end was drawn away from the face by the pulling cable, which was attached at the front outside corner of the machine, (4) the machine was too heavy to be pulled by available ropes. Developments in the war prevented efforts to improve on the original design.

The business end of the Schmidt machine was an upended fixed triangular steel frame around which rotated 10 parallel chains, each of which carried 42 bits placed at regular intervals. The chains formed a mining head nearly 5 ft wide.

The bits swept down the face at a speed of over 8 fps and carried the coal to the floor. There it was picked up by a loading bar and cast into the machine's chain conveyor, whence it was lifted over the top and discharged into a face conveyor behind the machine. A chipping head 5 in in diameter extended forward below the mining head at floor level. Cuttings from the chipping head were cast under the machine and pushed to the front end by the return sweep of the machine conveyor as it moved forward underneath the machine.

The newest development in Hungary is the Peto machine, modeled after the Schmidt. It has not yet been tried out underground, but if expectations are met, it will work in seams as thin as 4 ft.

The Peto design differs from the earlier Schmidt machine as follows: (1) the cutting head, instead of being fixed, sumps in, sweeps up the face, retracts and drops to the floor, being moved up and down by an electric hoist or a hydraulic system; (2) bits, mounted on parallel chains to form the mining head, break off the coal by upward movement and throw the coal over and backward into the machine conveyor; (3) instead of discharging at the rear into a face conveyor that must be moved up as the machine advances, the Peto machine has a transverse rubber-belt conveyor discharging into a face conveyor laid alongside the machine and extending the length of the face; (4) the Peto machine is mounted on crawlers, thus doing away with rope and winch and eliminating any tendency of the machine to yaw; and (5) the bit

arrangement breaks coal off the face instead of cutting it, thus reducing the percentage of fines.

Over-all length of the Peto-miner is planned at 14½ ft; width of mining head, 4 ft; height of machine, 4½ ft. A 90-hp motor will drive the cutter chains at 8 fps. A 3-hp motor will lift and lower the mining head, which is pivoted at its base, at a maximum of 4 fps.

The Peto-miner is being designed to mine 1 ton every 2 min, advancing 8 in per minute in a seam 6 ft thick. That means, allowing time for tramming, timbering and moving up the conveyor, about 430 tons in a 7½-hour day, working a 300-ft face. Maximum size produced is expected to be 12 in.

Fourteen men will be needed for a crew, as follows: three machine operators, four men to advance the stall at the starting end of the face, six men to timber and one man to change bits. When a cut is finished, two men will tram the machine back to its starting point, eight men will move the conveyor up to the face and four men will set posts. Timbering, according to plans, will involve staggered posts and crossbars and a good deal of forepoling, especially behind the machine.

## The Coal Plow

The coal plow, largely a German development but used also to some extent in Russia, consists basically of a vertical cutting edge which, pulled along a longwall face by a rope, peels off a layer of coal and deflects it onto a face conveyor lying between the plow and the first row of props. The face conveyor, being of sturdy, rigid construction, doubles as a guide for the plow. An advance gathering plow, with a horizontal blade close to the floor, clears a track for the plow assembly between the conveyor and the face, lifting the loose floor coal and turning it into the conveyor.

Usually, the plow is built with twin vertical cutting edges facing in opposite directions, permitting the plow to work in either direction across the face. A heading or stable must be provided at each end of the face to permit sumping in and to accommodate the sheaves and motors needed for drawing the plow.

Cutting blades for the plow come in three sizes—16, 24 and 32 in. Generally, in seams 48 in or thicker, a blade roughly equal to one-third the thickness of the seam is adequate. Overhanging coal, if not

brought down by its own weight, can be shot down later or brought down with pneumatic picks. The smallest-size plow is about 20 ft long and 27 in wide overall.

With a rate of advance in bituminous of about 20 fpm and a cutting depth of 12 in, a pulling load of 3 to 8 tons is required. In very hard coal, the pull required may be as high as 30 tons. Thickness of the slice ranges from about 4 to 32 in, depending on the hardness of the coal. Cutting blades require regrounding after cutting about 16,000 ft.

The efficiency of the plow depends mostly on the conveyor, which must be strong enough to hold the plow against the face so that the blade will cut to the right depth. That means that it must be of heavy construction. Since it must be moved up as the face advances, it must be flexible and easily maneuverable. Finally, since the loading rate sometimes runs as high as 4 to 5 tons per minute, power requirements are high. In fact, it is reported that more power is needed for the conveyor than for the plow itself.

As the plow moves along, it exerts an outward pressure of ½ to 2 tons against the conveyor. The conveyor usually is chain-type, made of sheet-steel troughs linked together to allow for undulations in the floor and to permit shoving it up to the new face after the plow has passed. It may be moved up by air cylinders braced against the props, by a wedge-shaped sledge dragged behind the plow between props and conveyor, or by horizontal ratchet jacks. The conveyor is kept as narrow as possible to permit timbering close to the face.

Since the plow advances rapidly and conventional timbering methods are slow, roof safety with the plow is a problem. Efforts to solve it by removing the strain on timbers include solid packing, strip packing and caving. Pneumatic packing methods have been used with some success. If caving is undertaken, all props must be removed and the roof must be made to break along a pre-established line.

As pointed out, the conveyor lies between the plow and the first row of props, minimum distance between face and props being some 40 to 45 in. For roof safety above the conveyor and the plow, forepoling bars, usually of steel and sometimes telescopic, are used, together with steel props designed to yield slightly to roof pressure.

To solve the double problem of

moving conveyors up and timbering safely with a minimum of lost time, engineers at one German mine worked out a plan like this: The plow takes an 11.8-in cut for half the length of the face and a 3.9-in cut in the remaining half. While the shallow cut is being made, timbers and the conveyor are moved up along the deep-cut half of the face. On its return pass, the plow takes the deeper cut for the first half, the shallower cut having made it unnecessary to move up timbers and conveyor. On the second half of the return pass, the plow takes a deeper cut, timbers and conveyor having been advanced earlier. Using this system on a 650-ft face, a crew is reported to have made 10 cuts in an 8¼-hour shift, producing about 400 tons.

Some modifications of the plow's basic design have been made, with various degrees of success. The Lange model, for example, uses individually vibrating bits in the cutting edge. The Lobbe model uses bits fastened rigidly to the blade, the entire plow frame being vibrated mechanically by eccentric rotors which, when spinning, provide a 100-ton to 200-ton percussive effect. However, the Lobbe model has not been altogether satisfactory because of energy losses in bearings and excessive friction. A third modification is self-propelled on crawlers.

A fourth model, the Westphalia machine, uses a conventional cutter in combination with the plow. The cutter, undercutting the face, is followed by the plow, which shears off the coal at the depth of the undercut. A crescent-shaped baffle, attached to and just behind the plow, deflects the coal onto the conveyor as the machine moves forward.

On the whole, the plow is said to work best in fairly friable coal, where roof pressure can be made to weaken the seam, where roof is good and where the floor is firm. However, in an Essen mine, the plow successfully worked a 46-in seam on a 25-deg pitch with a flaky roof that required timbering very close up to the face. A 14-in-high blade made 12-in-deep cuts across a 780-ft face. The mined-out area was allowed to cave after each 2-ft advance.

Postwar studies of German use of the coal plow in the Ruhr showed that out of a total of 2,093,000 tons of power-loaded coal in 1944, plows produced 998,000 tons; cutter-loaders, 830,000 tons; and other types of loaders, 265,000 tons. At the end

of 1948, however, only 20 plows were reported in use, though it was planned to install 100 more before 1950, mostly of the fixed-blade type.

In Russia, the plow is said to have doubled worker output wherever it has been used. Though mechanical details have been withheld by the Reds, it is safe to assume that the Russian plow does not differ substantially from conventional German types.

## Tunnel Drivers

**Germany**—British experts who made a postwar study of German mining machinery have suggested the possibility of adapting for coal mines the Schmidt-Kranz rotary tunneling machine, which was used successfully in potash mines to drive tunnels 7.2 ft in diameter at a rate of about  $4\frac{1}{2}$  ft per hour. Weighing 18 tons, the machine is equipped with a rotary cutting head, a hydraulic system and a 200-hp motor.

The cutting head is fitted with hard-metal bits so arranged that they cut concentric circular grooves as the head rotates, each groove being  $11\frac{1}{2}$  in wide. Ribs left between the grooves are broken off by teeth—one tooth to every groove, so arranged in the cutting head that they attack the edge of the rib when the groove is cut to a fixed depth, thus breaking off the rib at its base.

Cuttings are delivered to a belt conveyor or disposed of by a pneumatic system, which also carries off the heat generated by the cutting. The hydraulic system provides forward thrust for the head and guides and positions the machine.

Two vertically operating milling cutters, driven by a gear from the main shaft and positioned by the hydraulic system, cut tracks in the lower circumference of the tunnel as the machine advances. By adjusting the milling cutters, the operator can steer the machine up or down or in a wide-radius curve.

To be useful in coal mines, which usually require 12-ft-wide haulageways or more, the machine would have to be greatly enlarged. Likewise, because speed of the outside cutting bits on a 15-ft-diameter head would be too high with the rpm of the present machine, speed would have to be reduced to about 2 rpm. This probably would cut the rate of advance and would require a motor rating at something like 200 kw. If such a machine could be built and were found practicable, a

flat roadway could be built in the tunnel by shooting the floor, leaving the roof undisturbed as an arch over the roadway.

Along with the tunnel driver, plan for supporting the roof has been suggested, involving use of the milling cutters at the base of the machine to cut channels along the horizontal diameter of the tunnel. These channels would be used as platform supports for arched steel ribs fastened to the overlying strata by bolts. The lower half of the circular bore then would be squared out by machinery or by shooting to provide a wide, flat roadway.

**Russia**—In 1949, tests were reported under way of a combine driving machine that, it was predicted, would mechanize all tunnel work. No mechanical details have been made public.

## Conveyors

**Russia**—In 1949, work was reported under way on the design of a reversible scraper conveyor up to 820 ft long that would be suitable for any method of mechanical mining. Plans call for shifting the conveyor along without dismantling.

Earlier, in 1946, a 1,000-ft belt, capacity 180 tph, was reported to have been completed at the Voroshilov works. It was decreed that 500 of these units were to be put into operation in the Donbas field by the end of 1946.

## Shaft, Coal and Overburden Drills

**Britain**—A new Siskol coal drill, operated by a flexible drive from the cutter motor, was announced in 1949. A circular drill head houses the gear reduction.

**Russia**—A new shaft drill,  $8\frac{1}{2}$  ft in diameter with capacity of over  $2\frac{1}{2}$  ft per hour and with a hydro-turbine drive was reported in the blueprint stage some time ago. The Russians planned to use the same stream of water that turns the turbine for bringing the excavated soil to the surface.

In 1947, the Russians reported a new-type rotary drill for drilling 6-in vertical holes for blasting. The drill rig was said to have no slotting mechanism but, instead, two vertical guiding tubes about  $16\frac{1}{2}$

ft long, rigidly connected with the mast. A reducer with a 15- to 20-kw motor, 250 rpm, glides up and down along the tubes with the motor. The combined weight of reducer and motor totals about 880 lb, which is said to be adequate for feed pressure. Composite spiral augers with alloy-steel bits are used. The machine drills an 80-ft hole in 75 minutes, with negligible bit wear. It is said to be satisfactory for soft rock, clay, coal and similar materials but unsatisfactory for solid rock or boulders.

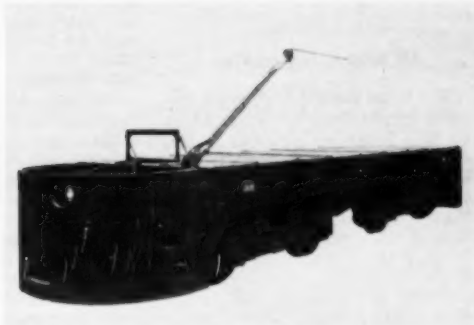
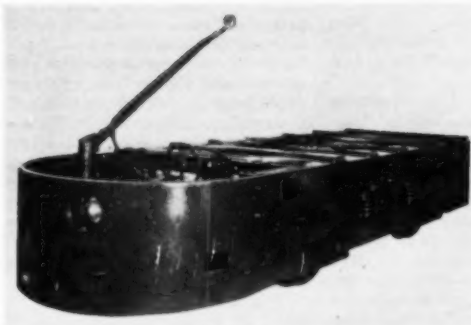
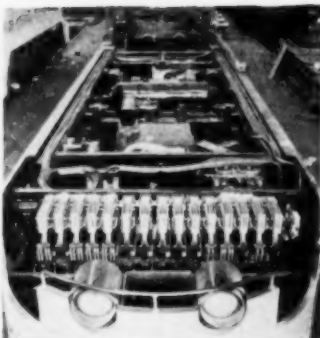
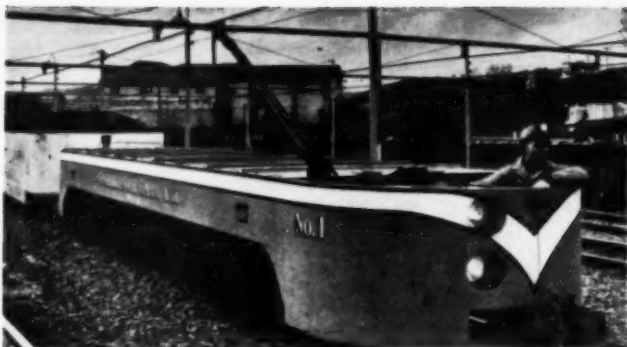
## Diesel Locomotives

**Germany**—Six types of diesel locomotive are used underground, ranging from 9 to 75 hp and up to 10 tons in weight. All are equipped with conventional exhaust-gas cleaners and flame dampeners. Safety laws require that the carbon monoxide content of undiluted exhaust gas be not above 0.12% at highest engine speed and that ventilation be at least 215 cfm per locomotive horsepower. Naturally, these locomotives meet the safety requirements.

**Britain**—The Hunslet diesel mine locomotive comes in several sizes, with horsepower ranging from 24 to 100 and weight from  $2\frac{3}{4}$  to over 15 tons. The 70-hp unit, for example, has a top speed of  $14\frac{1}{2}$  mph, weighs 10 tons and has a tractive effort in low gear of 5,400 lb. Other specifications are: wheelbase, 4 ft 3 in; length, 12 ft 9 in; height, 5 ft 3 in; width, 3 ft 10 in.

The "North British Miner," a new-type diesel locomotive manufactured by the North British Locomotive Works, Glasgow, is built to take no more space than a standard mine "tub." Working at 50% capacity, it is reported to haul from 100 to 200 tons at 3 to 15 mph at a cost of only 40¢ per hour for fuel. A stainless-steel-blade flame trap provides safety and an exhaust conditioner washes and cools exhaust gases by means of water, baffle plates and lessening rings. Tractive effort is 8,400 lb; horsepower, 100.

As of Dec. 31, 1948, the British National Coal Board had 191 flame-proof diesels in underground service as against only three in 1939. For example, the Bentley mine near Doncaster, one of the gasiest in the country, with gradients up to 1 in 15, then was using 15 Hunslet diesels to haul 14,000 tons per week out of a total output of 23,000 tons per week.



HIGHER EFFICIENCY with higher speeds and improved operator protection characterize . . .

## Modern Haulage Locomotives

**Trend Toward Higher Speeds Accompanied by Marked Improvement in Locomotive Riding and Tracking Qualities—Improved Mechanical and Electrical Features Promote Safety and Efficiency and Lengthen Locomotive Life**

By J. R. DOIG

Locomotive Engineering Div., General Electric Co., Erie, Pa.

A TREND toward high speed has recently become apparent in the mine-haulage field as a part of the effort to achieve more-efficient mine operation. A few years ago a speed of 8 mph was considered good, but now 12 to 15 mph is specified for new or revamped installations. At the same time operators in established fields are canvassing ways and means of speeding up their present haulage to obtain increased output and reduce operating costs.

This increase of approximately 50% in speed has been accompanied by a marked improvement in riding and tracking qualities—a welcome safety feature. The 20-ton locomotive of five or ten years ago had a wheelbase of 7 ft or less. The modern high-speed two-axle type has a wheelbase of 9 ft with consequent improvement in the riding qualities and general stability of the locomotive. Side equalization with coil springs, which eliminates all

wearing surfaces except between journal boxes and frame guides, smooths out the rough spots, and friction snubbers check the rebound. The effect of these improvements is even more pronounced on long-wheelbase locomotives than on the earlier types.

A radical departure in rear-end construction provides more security for the operator and more shock resistance for the frame. Until recently, all mine locomotives, of whatever size and type, were cut down at the rear end so that the operator sat, at least partly, on the end frame. One reason for this design was that it gave him an opportunity to jump clear if a collision or runaway was imminent. On the modern high-speed heavily built locomotive, both the ease and the wisdom of jumping are questionable.

The logical solution was to make it safer for the operator to remain in the locomotive. An end plate



## Modern Mine Locomotives Built to Offer Increased Safety and Efficiency

about 1½ in thick and as wide as the side frame was formed into a half circle, and the ends were welded to the side frame. This was supplemented by a heavy floor gusset and a bulkhead welded in place. Where there is a low roof in the haulageway, some cutting away at the top of the end frame is permissible without materially weakening the rear-end construction. The space provided for the operator is thus well armored. It has been found that a major collision does not seriously endanger the operator, while frame damage is eliminated. Striking timber or the rib usually is of little consequence because the rounded-end frame construction results in a glancing blow.

### Air Brakes Imperative

The trend toward high speed has made imperative one feature which up to a few years ago was seldom considered important. That feature is air brakes. In early applications of air brakes there were aspects that were not fully appreciated. One of these was that too high a lever ratio necessitates frequent brake adjustment, with consequent difficulty in obtaining full brake-shoe wear. Another was the effect of rotational inertia on braking rates.

In high-speed operation a goodly portion of the braking effort is used up in cutting down the rotative energy of the wheels, gearing and motor armatures. For this reason it is difficult to bring a high-speed locomotive to a quick stop. A third point was the advantage of the self-lapping straight air valve. Because this valve produces a brake application in proportion to the arc of movement of the handle, it is easy for the average operator to understand and handle. A welcome increase in braking capacity was obtained by using a 95-lb governor setting. This increase of 25% over former practice gave more reservoir capacity and more braking power at the same time.

It scarcely seems necessary to mention the advantages or necessity of air brakes on high-speed haulage locomotives. With hand brakes the operator can exert only a limited pull on the handwheel or lever. Total brake-shoe pressure, on the other hand, should equal the locomotive weight. Therefore, when only hand brakes are used on the heavier haulage units, a high lever ratio is necessary to get sufficient shoe pressure, and that requires extra wind-up time. In other words,

hand brakes are easily applied and effective on locomotives weighing up to and including 10 tons. Above that weight, particularly at present day speeds, hand brakes are too slow either for safety or efficient locomotive operation.

Safety and long locomotive life require a strong well-balanced frame construction without massive parts for ballast or for balancing. The welding on the main frame should be heavy—usually ¾ in to insure complete fusing of parts. Other "musts" are oversize pins and levers for brake parts, and non-vibrating equipment supports. All protruding nuts, lugs and steps should be eliminated in the interests of safety. This also enhances the streamlined effect obtained by the all-welded frame and rounded ends.

Various interesting features found on the modern haulage locomotive have come from years of experience in design and operation. For instance, bundles of wiring cables, when not enclosed in ducts, are supported by tape rails installed for that purpose only. A renewable steel wearing shoe under the gear case saves many a gear-case replacement or failure. A reducing valve in the air-sander line saves sand while making for better sand application. Continuous motor-axle caps with sleeve linings and end seals have increased lining life as much as 300% in some instances. Coil springs on brake-hanger studs are an almost sure cure for chattering brakes.

In addition to the conventional line of two-motor locomotives there are the three-motor single-unit and the four-motor double-truck types. Since the three-motor locomotive has equalization of weight over all axles, its riding qualities are better and it is easier on the track than the two-motor type. The three-motor locomotive offers a solution in certain narrow-gauge haulage problems where height is limited or light rails are used.

The narrow four-motor double-truck locomotive is the logical type for modern high-speed heavy-duty haulage applications. It rides well because the trucks are side equalized and the truck centers about 13 ft apart. It is easy on the rails because of its good weight distribution and the virtual elimination of nosing. Operation with double-truck cars on short radius curves is satisfactory because the coupling is carried on a swinging drawbar. Accessibility of parts encourages good maintenance.

So far we have considered only the mechanical features of the modern mine locomotive. The electrical equipment has been given equally careful attention, with the result that motors, many control items, protective equipment, headlights, blowers, trolley features and accessories are entirely new.

### Traction Motors Improved

Recent improvements in traction motors have resulted in a balanced design and reduction in wheel diameter with an increase in strength, overload capacity and continuous horsepower rating. Balanced design has been obtained by proper selection and distribution of all material used. Increased capacity has been accomplished by such changes as larger conductors; more rapid heat transfer from field coils to armature coils to core, with consequent elimination of sparking and decrease in heat produced at the brushes; box-frame construction, providing an unbroken magnetic path; and decreased tolerances made possible by modern tools and accurate machining methods.

The box-type frame assures a tight fit of the armature-bearing heads and maintains correct air-gap dimensions. These and the absence of wear in axle bearings assure maintenance of proper gear-center distances. A larger armature shaft further strengthened by a spider extension reduces deflection at the pinion and thereby increases gear life. Overload and continuous ratings have been improved by using Class B heatproof insulation, more copper in the windings and commutator, and brazed terminals.

The ventilating blower is an accessory to the traction motor that has become a necessity for high-speed haulage. An individual motor-driven set mounted on rigid supports, with a short flexible duct from the blower housing to the traction motor frame, has shown good reliability. The blower motor, being subject to the same sudden load and voltage changes as the traction motor, must be strong in every way. The impeller, mounted on the motor shaft, is of hammered-steel multiple construction to withstand vibration.

Experience has proved that the most effective volume of ventilating air is between 300 and 500 cfm, depending on the size of motor. Forced ventilation raises the 1-hr rated tractive effort approximately



15% and the continuous tractive effort 200%. Standard practice is to provide sufficient ventilation to obtain a continuous tractive effort equivalent to 17% of actual locomotive weight. This is enough to insure against the motors overheating in any haulage service if blowers are used continuously.

Straight-parallel 10-point motoring control, with nine or more railway-type contactors and a master switch or controller, has become almost universal for haulage locomotives of the two-, three- or four-motor type. When the locomotive is equipped with air brakes the contactors and the reverser are air-operated through magnet valves. Otherwise, they are solenoid-operated. The air-operated types are used wherever possible because they have greater capacity and reliability and operate over a wider range of trolley voltage. Hand reversing of traction motors by a drum switch in the controller has the advantage of eliminating the remote reverser but requires a large assortment of controllers to meet all conditions. This semi-magnetic feature is now limited to a few smaller-size locomotives.

#### Heavier Trips Started

Parallel control of motors permits starting heavier trips than with series-parallel because slippage of one pair of wheels does not affect the starting torque of the other motor. Ten-point control provides so small an increment between steps that heavier trips can be started and accelerated close to the wheel-slipping point without improper use of the brakes. The higher total starting current of parallel motor operation is offset by a decrease in wheel slippage and faster acceleration.

The problem of overload protection on 250-volt locomotives is one of finding a fuse of reasonable size to open the main circuit and a place to locate it, or of compromising on one or more relays that will drop out the main contactors in case of a motor overload or short circuit. Current values on 500-v locomotives are half as large but arcs are more vicious and more arcing space is required. When overload relays are used, they are set to trip at currents corresponding to 35% to 40% adhesion. For instance, the setting for a 15-ton 250-v high-speed locomotive would be approximately 500 amp per motor or 1,000 amp total. A lower fuse rating would be satisfactory because the fuse has time

delay to carry it through momentary overloads.

The main resistor must carry the full starting and accelerating current of the motors, which is 750 amp for a 15-ton locomotive. The energy to be dissipated in heat while accelerating a heavy trip may start at 170 kw, dropping to zero on the full running point and averaging 75 kw for 2 to 3 min. To properly handle this load, aluminum-chromium-alloy elements with a low-temperature coefficient are used. These provide a minimum increase in resistance up to the approved maximum temperature of 450 C. The best installation practice is to enclose the resistor on all sides while leaving the top and bottom as free as possible to get good chimney effect.

The old headlights with 115-v bulb-type lamps, separate glass or metal reflectors and cast cases are being displaced by the sealed-beam automobile type. There have always been objections to the old headlights, but until recently there were no satisfactory modern lamps around which to design a new line. First, there was not enough light; second, progressive deterioration from bulb blackening or a loss of reflecting surface was seldom corrected until after complete failure; third, illumination was almost negligible at times because of poor trolley voltage.

The following improvements are being made: two headlights instead of one have been installed on each end, a lamp of higher beam candlepower is used to increase pick-up distance, and the use of a glass lamp with screw terminals and an internal reflector eliminates light deterioration with age. These changes result in a larger volume of light and fair illumination with low trolley voltage. Another refinement frequently furnished is a constant-voltage source, such as a storage battery, with regulated charging. This assures good illumination regardless of trolley voltage fluctuations or pole dewirement.

The same swiveling wood-pole trolley with spring base, mounted in a well in the locomotive frame, is used regardless of capacity requirements. On light haulage locomotives, either a shoe- or wheel-type pole head may be used. On heavy haulage locomotives, however, the shoe type is necessary.

Difficulty is encountered in operating a shoe with a wheel collector under the same wire. The reason is that shoe operation requires a smooth wire and frequent

wire conditioning by greasing, while the wheel, because of its small arc of contact, burns the grease off and pits the wire. A light-weight pole head and long-contact shoe with low shoe pressure are necessary for high collecting capacity and reasonable wear.

An interesting trolley accessory now available is an air-operated retractor for lowering the pole quickly if the shoe leaves the wire. A hand valve convenient to the operator applies air to compress the trolley spring and lower the pole. The operator then guides the shoe under the wire as air leakage permits the pole to creep back up.

#### Dynamic Braking Available

In addition to the parallel motoring control usually supplied on haulage-type locomotives, graduated dynamic braking is available. This feature requires extra contactors and resistors and a master controller with an extra set of notches back of the "OFF" position. The usual motoring steps are obtained by notching the main handle clockwise while graduated braking steps result from notching in the counter-clockwise direction. The operator is forced to hesitate slightly at the "OFF" position to permit the control relay to pick up. This interval is just sufficient to prevent abuse of the traction motors by too sudden transition. In establishing the braking connection, motor fields are interchanged, a permanent resistor is inserted in the motor circuits, and the trolley contactors are deenergized.

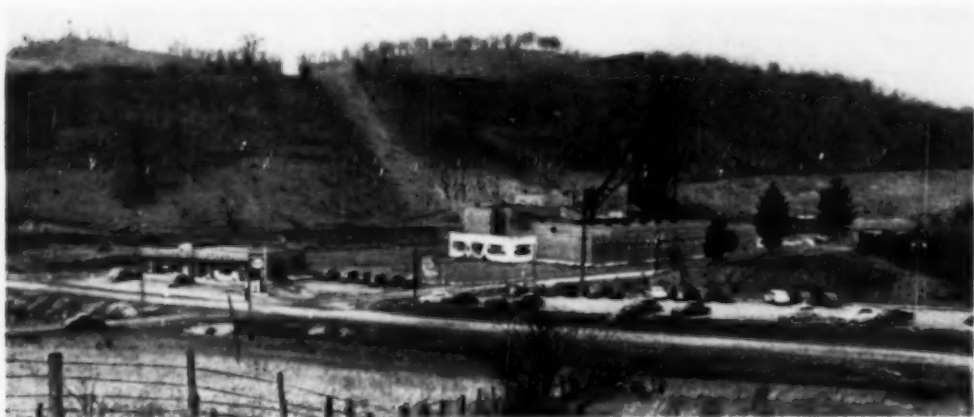
It is considered safe to use trolley voltage for the dynamic braking control circuits if the locomotive also is equipped with air brakes. Air is necessary for dynamic-braking control and, therefore, air brakes are normally available to bring the locomotive under control quickly in case of control-voltage failure from any cause. The addition of a storage battery and its charging equipment provides low voltage for the control at all times, and insures against interruptions of dynamic braking regardless of trolley voltage failure. Incidentally, this battery provides an excellent power source for the low-voltage headlight.

This long list of improvements adds up to the fact that the modern mine-haulage locomotive is far ahead of its predecessors. It is efficient, powerful, fast and safe, and is proving a valuable tool in the mining industry.

## Five Steps That Boosted Efficiency of 10,000-TPD Two-Mine Plant in . . .



**1. NEW ARKWRIGHT PLANT** preparing 10,000 tpd from two mines achieves a 70% labor saving . . .



**2. NEW LITTLE INDIAN CREEK PORTAL** cuts travel 5 mi for 748 men at Arkwright and Brock No. 4 mines, features the latest in modern office, bathhouse, store and service facilities.

# Modernizing Arkwright

**New Washing Plant Loading to Rail and River Replaces  
Two Tipples With Better Results and 70% Less Labor—  
New Portal Handling 748 Men Cuts Travel 5 Mi—Mine  
Designed for High Efficiency**

By J. H. EDWARDS, Associate Editor, Coal Age

NOW SHIPPING over 10,000 tons of cleaned coal per day from one plant and handling 748 men through one portal, the Christopher Coal

Co., Monongalia County, West Virginia, is reaping the benefits of a long-standing but recently completed program to increase mining

efficiency and modernize preparation. Production from Arkwright No. 1 and Osage No. 3 mines now is prepared at the new 600-tph Arkwright washing plant, and the men of Arkwright No. 1 and Brock No. 4 mines enter via an ultra-modern portal that cuts 5 mi from the man-trip travel, compared to what it would have been if use of the main-haulage portal had been continued.

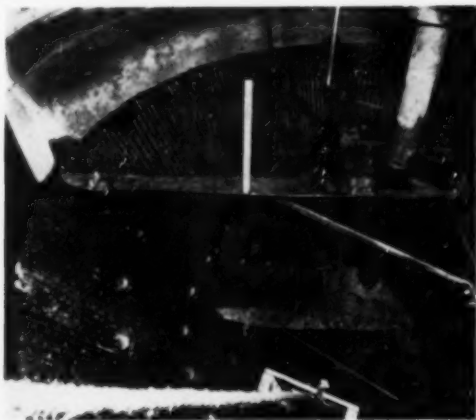
With experience in building two other large Chance sand-flotation plants as a guide, the company kept simplicity of operation and low maintenance foremost in designing



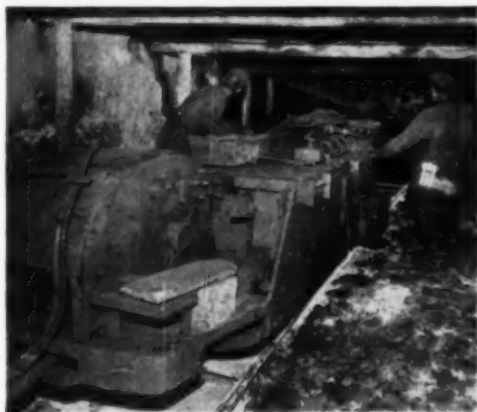
as it replaces old Arkwright and Osage surface plants (left and right) with modern facilities.



**3.** THREE 26-TON LOCOMOTIVES move coal over new 5-mi underground haulageway.



**4.** COAL PREPARATION is built around latest-type sand cone for operating economy.



**5.** MODERN EQUIPMENT and efficient management achieve high mining efficiencies underground at two-mine operation planned for an annual output of 2,500,000 tons during its 35-year life.



## Underground Mining Geared for Top Output per Man at New Arkwright

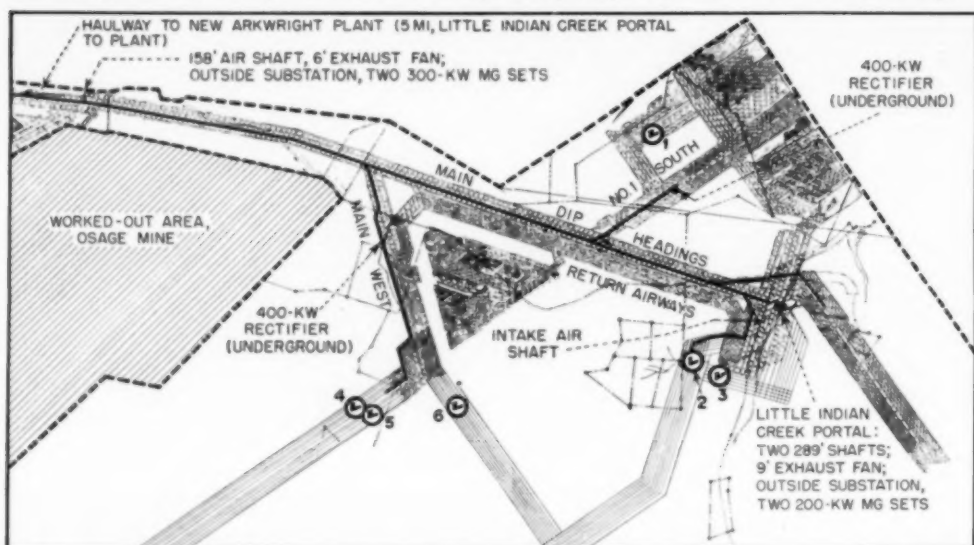
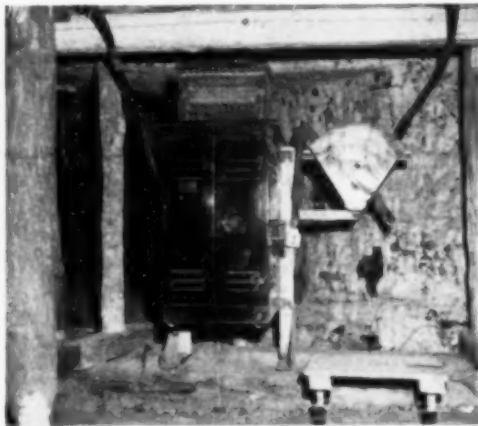


FIG. 1.—BOUNDARIES and/or outcrops of the new Arkwright mine are indicated by the heavy broken lines, with the main haulageways shown by the heavy solid lines. The circles locate the six mechanical-mining units which now produce 6,000 tons per three-shift day.



PRECAST CONCRETE SLABS used for top of new-type overcasts have reduced labor costs sharply and may be recovered.



ARKWRIGHT has 12 automatic reclosing circuit breakers underground. This 1,600-amp breaker feeds two loading units.

this third plant, which has both rail and river loading. Underground equipment and management methods at Arkwright—the largest mine involved—have been improved to modern standards of efficiency.

In contrast to an average of approximately 20 operating and maintenance men per shift at the new plant, 55 men per shift were employed at the tipple of the two plants displaced by Arkwright. The old Arkwright tipple required 30 men per shift, or a total of 90 men for a three-shift production of

4,000 tons daily. The Osage tipple, also displaced, employed 25 men per shift, or 75 for a three-shift production totaling 4,800 tons.

For each man of the total operating and maintenance force, the new Arkwright plant ships 182 tons of coal, while at the two old plants, with hand-picking, shipment was only 53 tons per man. As a result, the new plant turns out a far superior product and insures uniformity, with 70% less labor.

A subsidiary of the Pittsburgh-Consolidation Coal Co., the Christo-

pher Coal Co. is headed by W. H. Doolittle, of Fairmont, as president. C. R. Nailler, of Pursglove, is vice president in charge of operations. The company operates six mines which, in addition to Osage No. 3 and Arkwright No. 1, include Booth No. 6, Brock No. 4, Pursglove No. 8 and Pursglove No. 11, all near Morgantown, W. Va.

F. R. Zachar is general superintendent for the related organizations of the Christopher Coal Co., Geo. B. Flegal is chief mining engineer, Harry Richards is purchas-

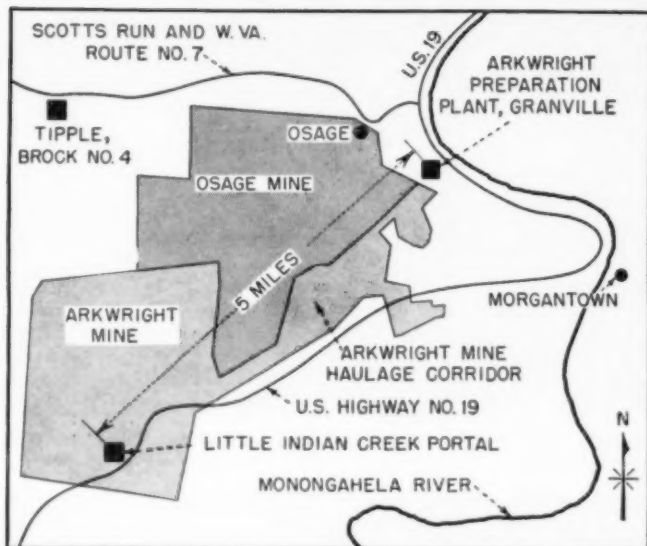


FIG. 2.—NEW ARKWRIGHT PLANT prepares Pittsburgh-seam coal from Arkwright and Osage mines. Brock No. 4 mine is in the Sewickley seam, 90 ft above Arkwright.

ing agent, and Hugh Douds is treasurer. Frank H. Brooks Sr., mine superintendent, is in general charge of the Arkwright mine and new Arkwright preparation plant. Henry Hines is superintendent of Osage mine, and J. Gantley is superintendent of Brock No. 4.

J. W. Murry, of the engineering department, Fairmont offices, Consolidation Coal Co. (W. Va.), guided the design of the Arkwright preparation plant, although the details were worked out by the builder, the Fairmont Machinery Co. The accumulated experience of Mr. Murry's department in the design and resultant performances of large-capacity Chance plants include the 1940-41 Owings, W. Va., plant (*Coal Age*, December, 1941) and the 1941-42 Jenkins, Ky., plant of the Consolidation Coal Co. (Ky.) (*Coal Age*, April, 1943).

Arkwright mine, with its original tipples at Granville, 4 mi north of Morgantown, was acquired by the present owners in 1943. In October, 1946, the company acquired both Brock No. 4 mine, the tipples of which still is in use at the end of the Scotts Run section, and Osage mine, which formerly loaded over Scotts Run tipples at Osage. Plans for modernization of the Arkwright mine (Pittsburgh seam) and its surface plant were changed in the construction stage to handle the Osage coal as well. Miners in

the Brock No. 4 (Sewickley) mine, as well as those in Arkwright mine, enter their respective seams through a new portal at Little Indian Creek. Osage men continue to use the original portal on Scotts Run.

As shown in Fig. 2, Osage and Arkwright mines lie in the Pittsburgh seam, with Brock No. 4 mine in the Sewickley seam 90 ft above. Boundaries of this overlying mine are not shown on the map, but the active territory is close to the Little Indian Creek portal shaft, which penetrates the Sewickley seam and has a landing at that level. The new Arkwright preparation plant, at Granville, was built beside the old wooden tipples, but the only part of it used was the old coal dump which is now a separate dump for mine cars hauling rock.

#### Output 2,500,000 Tons Yearly

A life expectancy of at least 35 years was assumed in designing the Arkwright preparation plant and new portal and in the rehabilitation of the mine, which is expected to produce 1,250,000 tons of coal annually during that period from its present assignment of 5,000 acres. It also is anticipated that output of Osage mine, which now is producing 1,000,000 tons per year, largely from territory in which preliminary mining was car-

ried on 20 years ago, will be increased to 1,250,000 tons. Coal reserves comparable to Arkwright can be assigned to Osage.

The location selected for the new portal is on U. S. 19, 6 mi southwest of Morgantown and near the center of the area allotted to Arkwright mine. A 5-mi underground haulageway was built from the old portal at Granville to the Little Indian Creek portal, 2½ mi of it through old workings and the balance consisting of new development in the virgin coal area.

To permit description of the mining conditions affecting preparation prior to that in the outside plant, this article will first present the highlights of the new haulageway, the working methods at Arkwright, the portal development and, finally, the new preparation plant.

#### Mine 84 in of Pittsburgh Seam

The main bed of the Pittsburgh seam consists of 100 in of coal, 84 in of which is mined, leaving 16 in of top coal to support 8 in of soft fireclay. Above the fireclay there is a 12-in stratum of additional coal and 15 to 20 ft of weak slate and fireclay up to a strong limestone. The 84 in of coal regularly mined contains the characteristic 1-in sulphur band 6 ft from the bottom. The presence of the sulphur balls makes cutting the bottleneck in mining operations.

The 5-mi main haulageway, utilizing 85-lb Thermit-welded rail, is on a 2½% grade against the loads. Track gage is 42 in and the 7x9-in by 6½-ft creosoted ties laid on 24-in centers are ballasted with 1½x½-in crushed river gravel. The track is drained by 10-in tile, with a Y-tile every 100 ft to serve as an intake and clean-out hole. Timbering consists of steel rail, supported on steel-rail stringers, which in turn are placed on steel pins set in the ribs.

Further protection along some stretches of the haulageway, especially in the corridor through the old workings, consists of creosoted lagging between the steel-rail crossbars. For ½ mi of the haulageway, 4 to 8 ft has been scaled from the roof and two ½-in coats of gunite applied. The first coat of cement is applied immediately after the final scaling. Similar permanent treatment is planned for the entire 5-mi main line, from the haulage portal to the shaft of the man-and-materials portal.

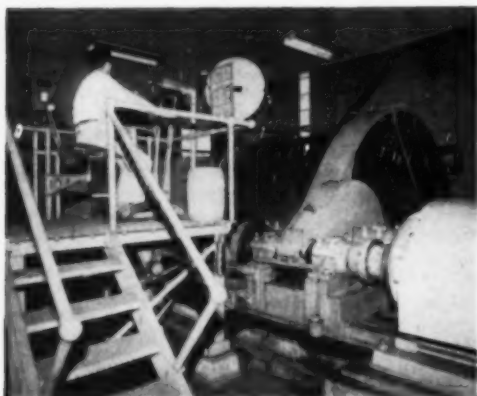
Major units of underground equipment include the following:



## Modern Portal Facilities Cut Travel Time With Maximum Service to Men



NEW LITTLE INDIAN CREEK PORTAL as approached from the southwest on U. S. 19. A parking lot to the right beyond the administration building is fenced, paved and marked for 200 cars. Little Indian Creek flows between the hoist house and shaft.



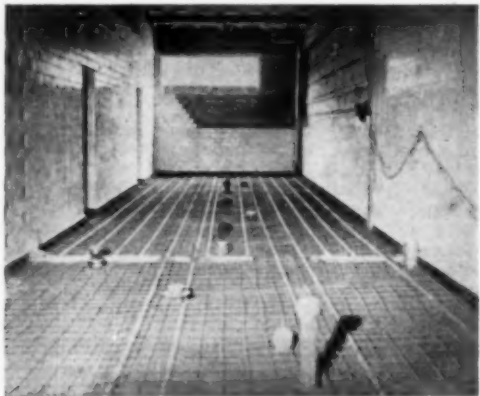
300-HP HOIST handles men and materials. Counterbalanced cage with two  $1\frac{3}{8}$ -in ropes hoists state limit of 20 men.



WAITING-ROOM at top of the shaft is connected to the administration building by a brick corridor.



BATHHOUSE SHOWERS have individual mixing valves. Glazed-tile walls, used throughout building except in supply room, eliminate painting and reduce maintenance.



RADIANT HEATING provided through wrought-iron pipes shown here in shower room previous to pouring the concrete floor heats both locker and shower rooms.



**SHALLOW POCKETS** in counter top hold miners' lamps, with life checks in corresponding positions on front of the counter.



**OFFICE SHARED** by Frank H. Brooks Sr. (left) and J. Gartley, Arkwright and Brock superintendents, typifies modern facilities.



**STEEL LOCKERS** feature forced ventilation via ducts on top. Radiant heat in floors of both locker and shower rooms eliminates drafts and insures uniformity.

eight (six working) Goodman 460 track-mounted loaders; eight (six working) Jeffrey 29U track-mounted cutters with 9-ft bars, using Bowditch throwaway bits; 15 (six working) Jeffrey A7 hand-held electric coal drills; 200 Differential 8-wheel mine cars, presently averaging 9.3 tons of material per trip; nine (eight in use or one per loader) Jeffrey 8-ton 2100-type cable-reel locomotives operating with a car-change distance of 160 ft, which is every second crosscut; three General Electric 10-ton relay locomotives; three (one spare) Differential 26-ton 8-wheeled main-line locomotives, with two used per trip (one at each end) at 20 mph.

Additional mining equipment includes: six Jeffrey 6-ton cable-reel locomotives hauling slate and supplies; two portable air compressors for haulageway grading and gun-

ing; one gunite machine; eight Gorman-Rupp and two Weinman gathering pumps; three underground stations pumping to the outside, one equipped with a 1,000-gpm Warren centrifugal, the second with a 3,000-gpm Cook turbine and the third with a Weinman 1,000-gpm centrifugal.

#### Development at Arkwright

Most of the Arkwright coal presently comes from development, which consists of primary entries composed of 14-ft parallel headings on 60-ft centers. Crosscuts are driven 60 deg on 90-ft centers, except for the center pillars dividing the two groups of seven entries, which are cut through only every 450 ft. Secondary entries consist of five or six headings, also 14 ft wide but on 60.62-ft centers. In

sections where pillars are not recovered, rooms are driven 20 ft wide at 60 deg on 34.64-ft centers as measured along the room entry.

Because of the active mining in Brock No. 4 mine in the Sewickley seam 90 ft above, only limited pillar extraction is under way in Arkwright and a permanent section plan for complete extraction has not been formulated. For this recovery, room blocks will probably measure 90x90 ft, but may be 53x100 ft. Partial recovery of entry pillars is accomplished by splitting through the center and taking a cut off the far end. Cover over the present active areas ranges from 200 to 500 ft.

The five working places usually allotted to a machine yield 32 tons per place per 8 ft cut. In addition to a top cut, a vertical shear is made at a point in line with the right-hand rail. One hole is drilled on the right-hand side and two on the left. Each hole is loaded with six 1 1/4x8-in sticks of du Pont Monobel AA.

The normal crew of 13 men consists of: a loading-machine operator, loading-machine helper, cutter, cutter helper, motorman, brakeman, shotfirer, driller, three timbermen and two trackmen, plus a boss.

To prevent the loading machine from knocking out timbering, the two wooden crossbars closest to the face are supported on screw jacks, which in turn rest on pins set in the coal rib 2 ft above the floor. After the following cut is completed, full-length posts are set under the bars. In aircourses, locust posts with 14-in caps are set 5 ft apart in one row along the center

## Efficient Coal-Handling Equipment Effectively Used at New Arkwright Plant



AT ARKWRIGHT PLANT—A is r-o-m belt to rotary breaker on top of storage silo; B, No. 1 refuse belt; C, raw-coal conveyor from silo to plant; D, glass-walled crow's nest from which tippie operator controls booms, layer-loading hoists and transfer chute.



MAIN-HAULAGE PORTAL is indicated by A; B is the No. 2 refuse conveyor; C, refuse-belt transfer house; D, mine-car dump-house; E, r-o-m belt from dump; F, rotary-breaker house; G, top storage silo; H, washing plant; and I, river terminal.



FRONT GALLERY houses the No. 1 refuse belt. In the center is the 5x0 raw-coal belt from storage silo to plant, and in the distance, the belt conveying coal to the barge terminal.



MINE CARS AVERAGE 9.3 tons. Rotary-breaker house is at left. Behind the refuse-belt transfer house at the right are two 100,000-gal wooden tanks for storage of wash water.

after the track has been taken up. The wooden crossbars and posts then are removed.

Track throughout the sections is 40-lb rail on Bethlehem steel ties, with No. 2½ switches. Several new-type overcasts have been installed, built with size 22 6x12-in by 14-ft precast reinforced-concrete slabs resting on cinder-block walls. Each slab has two 4-in holes running through the full length and provided for piping or electric wiring when the slabs are used in building construction. To install them, the slabs are hoisted with a cutting-machine bar and laid flat skin to skin. Grout then is poured in the cracks. It is expected that they can be recovered easily and will be reused. The slabs used for overcasts thus far were left-overs purchased for an outside construction job. Labor required for this type of overcast construction was found to be considerably lower than that for any other type of flat-top overcast.

Mine power at 275 v dc is supplied through inside and outside substations of both the rectifier and mg types. Twelve I.T.E. Type KSC automatic reclosing circuit breakers protect the underground distribution system. Ohio Brass 1,500-amp safety switches installed on the live sides of the breakers permit cutting off the breakers for inspection and repair.

The mining-equipment repair shop for Arkwright is underground about 1 mi from the bottom of the Little Indian Creek portal shaft. No machine tools are included in the equipment for this shop.

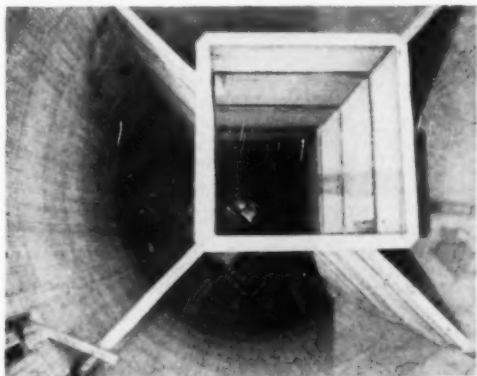
At the Little Indian Creek portal, there are two 289-ft shafts 300 ft apart. The 20x40-ft main shaft,



ROTARY BREAKER fed at 700 tph by r-o-m belt conveyor (right) from the mine-car dump is located on top of the 2,200-ton five-compartment concrete storage silo.



TWO SIZES OF MINE CARS are handled by the rotary dump. Roller-disk hold-downs hold lower cars in dumping, are pushed back out of the way by larger cars  $7\frac{1}{2}$  in higher without undue wear.



2,200-TON RAW-COAL STORAGE SILO, 50 ft in diameter and 62 ft deep, has five compartments, each equipped with reciprocating feeders with variable speed drives as shown at the bottom in left view taken during construction. Coal-lowering spirals (right) installed in each silo compartment decrease degradation.



LOOKING FROM THE RIVER DOCK toward the Arkwright plant. The 36-in belt conveying coal to the barge-loading tippie on the Monongahela is 800 ft long.

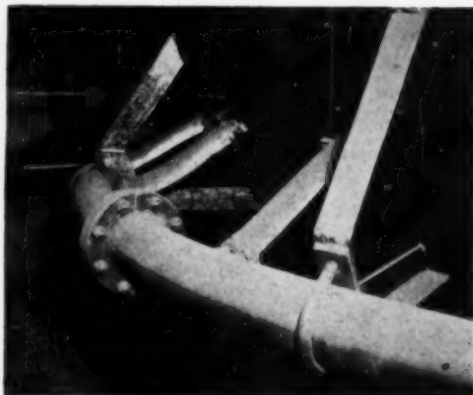


FIVE METERS on top of control board register coal flow from the silo compartments. Charles Swope (left) is general outside foreman and Kermit League maintenance foreman.

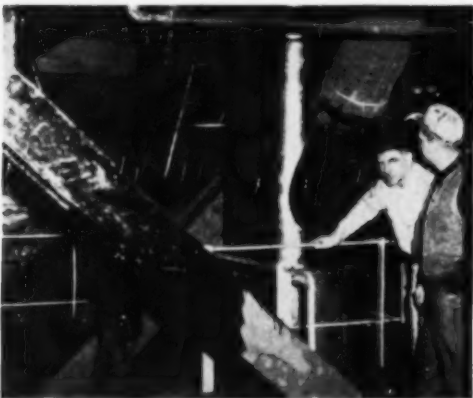
## Arkwright Washing Unit Achieves Operating and Maintenance Economy



LARGE-SIZE SAND CONE, 15 ft in diameter, efficiently washes 400 tph of 5x3-in coal. Rejects average 8 to 9% of raw feed.



ONE OF FOUR water-supply manifold pipes connected to cone nozzles by short hoses—a new design that eases maintenance.



TO ELIMINATE MAINTENANCE, 31-in steel column return dewatering pipe (left) was lined with concrete pipe when wear began to appear after six months' use. Top end of pipe (right) shows the 24-in (I.D.) concrete pipe, which was grouted into the steel pipe.



which was sunk from the top and connected with the mine in March, 1946, has the main Arkwright fan and also the hoisting equipment, including a 7½x18-ft overturning cage normally used for men and materials but which could be employed for hoisting mine cars of refuse. The other shaft, 13 ft by 24 ft 9 in, also has two compartments, one serving as an intake for Arkwright mine and the other as an intake for Brock No. 4 mine (Sewickley seam).

The hoist, purchased new for this installation, was made by the Vulcan Iron Works, Wilkes-Barre, Pa., and is driven by a 300-hp GE motor. Cage weight is 16 tons and that of the counterweight 18 tons. With two 1½-in ropes connected to the cage, the safety factor in handling men is very high. Twenty

men are carried per trip, which is the maximum that the W. Va. Department of Mines has permitted on any mine hoisting equipment. The hoisting compartment also serves as an intake for Arkwright mine.

A gallery of brick construction leads from the top of the man-shaft to a 180x200-ft brick administration building housing a payroll office; superintendent's, resident engineer's and mine foremen's offices; assembly rooms, lamphouse, shower rooms for miners and foremen, hospital or first-aid room and a supply-room for both Arkwright and Brock No. 4 mines. Inside walls of all rooms, except those of the supply-room, are glazed tile. The tile eliminates wall painting and can be kept clean at minimum cost.

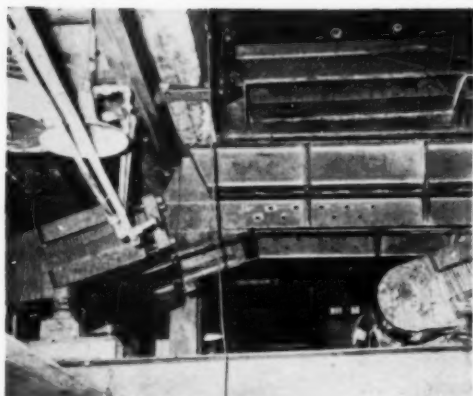
Arrangement of the lamp room

is tops in convenience for both the miners and the lampman. It is practically self-serving, although the lamps still receive the careful attention that only a lampman can give. The service-counter top consists of shallow pockets, from which the miners take their lamps and into which they return them at the end of the shift, using the same lamp each day. Life checks for the men hang on the outside of the counter near the lamps. The checks are not the same as the lamp numbers.

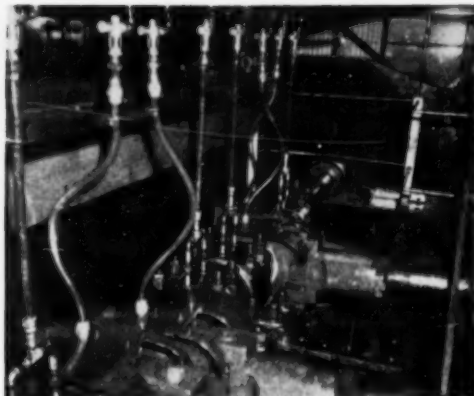
Lamps for each of the three shifts are identified by colored plastic rings on the cable near the headpiece. The rings are short sections cut from non-twist plastic spirals made for telephone cords.

This new portal handles a total of 748 men, as follows—Arkwright:

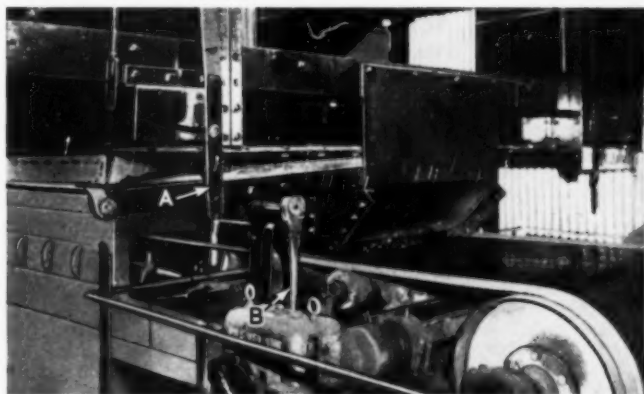




MAGNETIC VIBRATOR conveys wet coal that would stick to a belt 15 ft horizontally to a mixing drag conveyor.



FORCE-FEED OILING SYSTEM lubricating the 68 babbitted bearings has 500-gal oil storage tank and return-oil filter.



NEWLY DESIGNED dribble-free gate on a scraper-type mixing conveyor—Lever A raises and lowers the gate and Ratchet Lever B racks it to the open and closed positions.

first or midnight shift, 110; second shift, 194; third shift, 122. Brock No. 4: 96, 130 and 96 men, respectively.

Shower and locker rooms have radiant heat installed in the concrete floors—a provision that insures uniformity and freedom from drafts. The coils, cast into the concrete, are wrought-iron pipe made by the A. M. Myers Co. The wrought iron is highly resistant to corrosion, as compared with steel.

Portal facilities include a fenced hard-surfaced parking lot marked off for 200 cars. A brick building near the administration building houses a service station, store and grill. The grill is open from 6:50 am to 11:30 pm to accommodate all shifts.

A timber yard served by mine tracks from the surface landing of

the shaft is equipped with racks made from steel rail, which keep all posts and crossbars 16 in above the ground. Mine rails are taken in at a drift opening where the main haulageway crosses a hollow, rather than at the portal. An outside shop to accommodate Brock No. 4 mine was built 500 ft from the shaft.

In designing the preparation plant, the company decided that it would not pay to wash coal below  $\frac{3}{8}$  in, since the normal raw slack can be held, with close attention, to 10% ash or lower, and in excess of 13,000 Btu. In view of the relatively low mining cost in this area, raw slack of such quality constitutes an excellent steam-plant fuel. River and railroad shipping were provided for and, according to recent averages, about 500,000 tons

of the 2,500,000-ton annual output of the plant will be shipped by river.

The plant, designed for 600-tph raw feed and three-shift operation, was built by the Fairmont Machinery Co. Briefly, it includes the following equipment: rotary dump; Bradford breaker reducing the raw coal to 5 in; a 2,200-ton five-compartment storage silo; vibrating main screens to remove the minus- $\frac{3}{8}$ -in size; a 15-ft Chance sand-flotation cone; dewatering and sizing screens; mixing conveyors; belt-type loading booms; domestic bins; a belt conveyor to the river; and the barge-loading equipment.

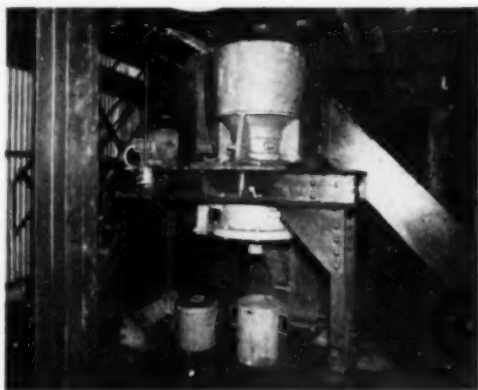
Mine cars are dumped entrain at the rate of one per minute, or slightly faster, in a Nolan rotary dump equipped for handling two sizes of mine cars, since the Osage cars are 7 $\frac{1}{2}$  in lower than the Arkwright cars. The usual stationary flanges of the dump cradle act as the hold-downs for the top edges of the higher cars. For the lower cars, the hold-downs are four 16-in-diameter disks 1 $\frac{3}{4}$  in thick, horizontally mounted on vertical axles. The disks are forced into a holding position by automobile-type leaf springs. When the higher cars enter, they simply push the disks out of the way, which rotate and roll against the sides of the higher cars as they pass through, causing no undue wear.

The Bradford breaker, fed at 700 tph, is located in a steel building on top of the circular concrete storage silo. Sulphur balls and other hard refuse materials, separated out by the breaker, drop to a bin, from which they are hauled by truck to the dump. The raw-coal silo, 62 ft high and 50 ft in diameter, has a

## Refuse-Disposal and Sampling Facilities Typify Arkwright Modernization



REFUSE DISPOSAL is handled by a 20-ton truck, hauling 1,200 tons daily from this 250-ton hilltop bin to a dump nearby.



AUTOMATIC SAMPLER AND GRINDER permits continuous sampling of  $\frac{3}{4}$ -in unwashed slack, held to 10% ash for power-plant use.

250-ton square center bin and four 480-ton peripheral sections, each equipped with a Robert Holmes coal-lowering spiral. The center section fills first, the overflow going to the other sections.

### Consistent Coal Feed Maintained

At the bottom of the silo are feeders from each section to a 48-in raw-coal belt conveying to the main vibrating screens at the top of the main plant. Each feeder has a Link-Belt P.I.V. variable-speed drive equipped with an electrical totalizing and interlock arrangement that maintains the coal feed at 600 tph regardless of whether one or several feeders are in use. Meters on a central control board in the plant register the flow from each feeder. To reduce segregation, at least three of the bins are kept feeding to the belt.

The main structure of the plant measures 100x200 ft, has seven stories and is 150 ft high.

Primary sizing into 5x $\frac{3}{4}$ -in and  $\frac{3}{4}$ -in-x0 is accomplished on four Allis-Chalmers 6x16-ft Ripl-Flo vibrating screens completely housed to confine dust.

The Chance cone, in which the 5x $\frac{3}{4}$ -in is washed, is the largest size made and is the improved type, equipped with separate pipes for manifolds and short hoses connecting to the nozzles instead of structural-steel manifolds welded directly to the casing. This construction has materially simplified maintenance.

In addition, the cone is lined with  $\frac{3}{4}$ -in reinforcing bars tack-welded to the casing. The bars, placed on 4-in centers at the top and 1 $\frac{1}{2}$ -in

centers at the bottom, catch rock and slate in the wedge and dovetail spaces, thus almost completely protecting the casing from wear. Unless holes are drilled through the casing of a cone, it is practically impossible to determine the thickness of a worn plate in an unlined cone. In the Arkwright cone, wear shows on the reinforcing bars, and when they become thin, new bars are welded on top of the old ones.

The cone is operated with the refuse gates open all the time, which is another maintenance saver that is possible because the refuse elevator is tall enough to balance the water in the cone.

Gravity is maintained to wash at 1.45. Reject from the cone totals 8 to 9% of the raw feed and the clean-coal output is approximately 365 tph.

Primary dewatering and sizing screens are the shaker type. The washed  $\frac{3}{4}$ x3/32-in from the primary is desanded and dewatered on two Allis-Chalmers 5x14-ft Low-Head vibrators.

Refuse from the cone elevator passes over an Allis-Chalmers Ripl-Flo desanding and dewatering screen, and then to the 700-ft No. 1 refuse belt conveyor, which takes the material up the hill to a 30-ton bin near the mine-car dump. From the bin, refuse is conveyed by the No. 2 belt (1,050-ft centers) to a 250-ton truck-loading bin at the top of the hill. The total lift is 400 ft. Disposal to a nearby dump is handled by a 20-ton Walter truck.

As a result of abrasion and acid water, the 31-in steel column pipe from the dewatering and desanding screens to the sump showed signs of wearing through within six

months after the plant begun operation. This maintenance headache was cured by placing 24-in (I.D.) reinforced concrete pipe inside the steel column and grouting it in.

To solve the problem of moving  $\frac{3}{4}$ -in-x0 wet coal 15 ft horizontally to a mixing drag conveyor, a Syntron feeder with two magnetic drives was installed. A belt was not used because of the difficulties with wet coal sticking.

Sand-handling apparatus, as in the balance of the plant, was planned for minimum operating labor and minimum maintenance cost. Sand is dumped from hopper-bottom railroad cars into a 150-ton two-compartment bin under No. 1 tippie track, from which it is elevated at 10 tph by a Wilfley sand pump that handles about 22% solids, using some of the circulating water from the coal-washing system. Sand usually is pumped twice a shift.

### Belt Conveyors Widely Used

To achieve lower maintenance through the fact that acid water corrodes steel and does not injure rubber, belt conveyors are employed wherever practicable throughout the plant. There are 11 belt conveyors, five scraper conveyors, the one Syntron conveyor and two shaking conveyors. The scraper conveyors, used only where it is necessary to discharge at two or more points and/or where it is advantageous to use both runs for conveying in two directions, are built with  $\frac{3}{4}$ -in abrasion-resisting steel bottoms and are equipped with dribble-free gates—a new design by



**SAMPLING LABORATORY** near the tippie provides daily data for the careful regulation of plant performance. Mining supervision helps hold down ash content of unwashed slack.



**NORMAL CAR SUPPLY** per shift at Arkwright consists of 100 empties.

the Fairmont Machinery Co. In opening, the gates drop down a few inches and then slide. When closed, they are truly dribble-free, but care must be exercised to scrape or wash away material that would prevent tight closing.

Two shaker conveyors, on 15-deg slopes and operating at 100 strokes per minute, transfer coal between the mixing conveyors and the egg and nut booms.

Belt-type loading booms serving the egg, nut and stoker tracks are equipped with Fairmont air-operated transfer chutes, which move forward and then drop down at the rear to divert coal flow to the empty car as the trip advances. A pants chute equipped with an air-operated gate handles the slack. Brown-Fayro layer-loading hoists act as car retarders and layer loaders.

#### 800-Ft Belt to River Tippie

Two belt conveyors carry coal from the mixing conveyors to three 80-ton domestic bins and to a 36-in by 800-ft belt conveyor extending to the river. Any one of the three domestic bins can be used for truck sales of stoker, nut or egg, and two of the bins have Holmes lowering spirals. The river terminal includes modern electric-hoist equipment to move barges and a pants-type air-operated chute for continuous loading while changing barges.

Viking oil-treating equipment in the main plant for preparing dustless treated coals includes spray boxes at five points. One treats the  $\frac{3}{4}$ -in x 0 as it leaves the main screens, a second the  $\frac{3}{4}$  x  $\frac{3}{4}$ -in coming from the secondary dewatering screens, and three the three sizes

in the 5- to 1 $\frac{1}{4}$ -in range as they leave the sizing screens prior to passing to the mixing conveyors or booms.

Timken bearings are employed on all shafts up to 5 in. There are only 68 babitted bearings in the plant, lubrication of which is automatically handled by a Bowser system that includes a pump, filter, 500-gal oil-storage tank and the sight-feed metering valves at each bearing. Link-Belt idlers are used throughout the plant, except on the No. 2 refuse belt, which has Continental Gin idlers. All gears and pinions are the special heat-treated type made by the Tool Steel Gear & Pinion Co.

Wash water is pumped from the Monongahela River through two cast-iron lines to two 100-gal wooden tanks on the hill near the car dump. Supply pressure into the plant is approximately 85 psi.

The plant features steel and concrete construction throughout and all walkways are steel gratings. Steam heat for oil heating and cold-weather space heating is generated in a 100-hp boiler in the basement of the main building and equipped with a Firate stoker made by the Hoffman Combustion Engineering Co. To reduce labor in handling cleanup coal and refuse from the tippie tracks, a bucket elevator was installed on the outside wall of the plant. It can discharge either to the cone feed or to the refuse belt as desired.

Efforts of the designers to eliminate equipment wherever possible and to plan for low maintenance are paying off in the relatively small crew required for operation and maintenance. Including the

dumping of coal and rock, refuse trucking and river-barge loading, the plant crew for each shift totals 15 men, plus a clean-up man on the day shift only.

#### Plant Crew Relatively Small

The crew for each shift includes a dumper; dumper helper, who also dumps mine rock and at times relieves the mine dispatcher; cone operator; cone-operator helper, who also looks after the stoker-fired boiler and does some clean-up work; main-control operator, stationed in a glass crow's-nest near the end of the booms and who controls the layer-loading hoists, booms and boom-diverting chutes; greaser; empty-car cleaner; two empty-car droppers; river-tippie operator; one truck driver handling cone rejects and another handling mine rock and Bradford-breaker rejects. The clean-up man does practically all the clean-up work for the Bradford breaker house and run-of-mine conveyor gallery in one shift.

When the plant is loading only to the river, tippie men assist at the river or do clean-up work in the main plant. When it is loading exclusively to railroad cars, the river man cleans up at his end or helps around the main plant. At times, only one size is loaded to railroad cars and the remainder is sent to the barges.

Plant maintenance is supervised by Kermit League, reporting to Charles Swope, general outside foreman, who has direct responsibility for the plant. Under Mr. League are 10 maintenance men who work on various shifts as necessary.



NEW OFFICE at Roseann (Va.) mine is within 600 ft of the washing plant and tipple (left). Precast concrete slabs facilitated construction of ceilings and roof, without plastering.

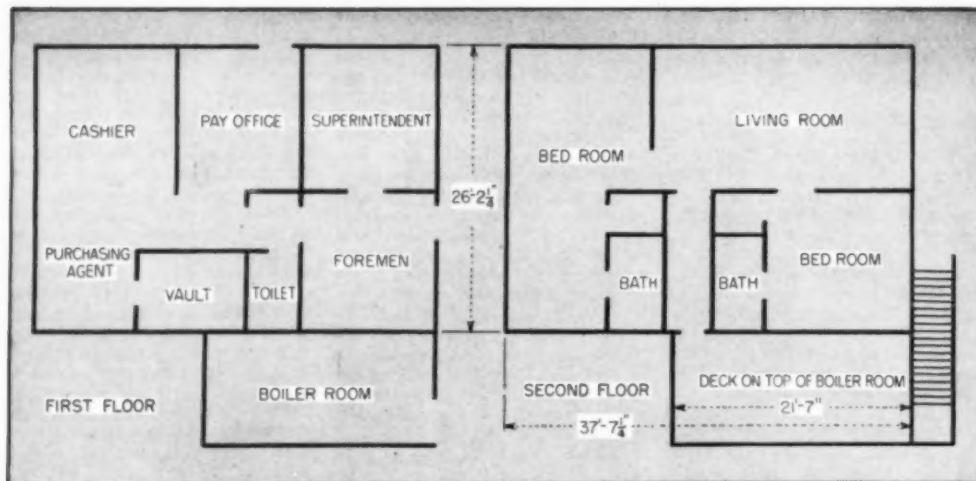


THE APARTMENT on the second floor is reached by the stairs at the left. Glass-brick panels over the first-floor doors and windows add to appearance and admit light without glare.

## Dual-Purpose Mine Building

New Fireproof Structure Houses Modern Office on First Floor and Sleeping Accommodations for Visiting Officials on the Second—Precast Concrete Slabs Used for Floors Provide Attractive Ceilings Without Plastering

PRECAST CONCRETE SLABS were used very effectively for the first and second floors and the roof of a fireproof cinder-block mine office recently completed by the Panther Coal Co., Inc., at Roseann, Buchanan County, Va. In addition



NEW ROSEANN MINE BUILDING was designed to provide a modern mine office on the first floor and sleeping apartments for visiting officials on the second. Since the concrete-slab ceilings rest on partitions, room arrangement was worked out in accordance with the standard lengths of slabs available.



DECK OVER one-story heating plant serves as an entrance to apartment built for visiting officials. Stoker-fired hot-water system also heats retail store and store manager's residence.



INSIDE VIEW OF OFFICE, with P. J. Thompson, manager, Southern Supply Corp., which buys supplies for the Leckie properties. Fireproofing included new set of all-metal furniture.

to their speed of erection and fireproof qualities, the slabs offered the advantage of having their undersides serve as attractively paneled ceilings without plastering. The second floor of the two-story building is equipped as a sleeping apartment for visiting officials and has its own outside entrance.

Outside dimensions of the main building are 26 ft 2 1/4 in by 37 ft 7 1/4 in. Extending from the rear of the building is a single-story heat-

ing plant, the roof of which serves as a deck by which the apartment is entered. Ceiling height of the first floor is 10 ft 2 in and that of the second, or apartment, floor 8 ft 3 1/2 in. The heating plant, a stoker-fired hot-water system, also heats the retail store and store manager's residence.

The "Flexicore" reinforced slabs, made by the Arrowcrete Corp., Columbus, Ohio, measure 6x12 in cross-section, with two 4-in holes lengthwise that provide a convenient concealing space for plumbing and wiring. The slabs are available in any length up to 22 ft and with varying quantities of reinforcing for carrying capacities ranging from 40 to 200 lb per sq ft. The roof slabs, of Zonite light-aggregate concrete which also provides insulation, were installed on a slight pitch and covered with built-up roofing.

Securing the smooth ceilings without plaster depended largely on the care exercised in laying the slabs so that they were installed on the same level and as a flat surface except for the V-grooves formed by the beveled edges. The smooth ceiling surfaces made by the bottom of the slabs were painted white.

Floors are covered with asphalt tile laid directly on the concrete slabs, without dressing. However, W. W. Coleman, chief engineer, who designed the building, reports that experience on this job indicated that the tops of the slabs should have been dressed to secure

a completely smooth job with the asphalt tile. In commenting on the use of slabs for this building, Mr. Coleman reported that they went up quickly, compared favorably in cost with frame construction and at the same time provided the desired fireproof qualities.

Because the inside ends of the slabs are supported on the partitions, the arrangement of the rooms was worked out in accordance with the standard lengths of slabs available. The first-floor slabs are approximately 3 ft from the ground, leaving a ventilated crawl space below. Glass brick above windows and doors of the first floor add to the appearance both inside and out and permit better daylight illumination. In the office, fireproofness was maintained by installing a complete new set of all-metal furniture, including filing cabinets, desks, chairs, etc.

Roseann mine, opened in 1934 in what was then a new coal field (*Coal Age*, August, 1934), has a remaining life estimated at 40 years. The new building is expected to cost very little in maintenance over that period.

Panther Coal Co. is one of the Leckie properties in Virginia, West Virginia and eastern Kentucky. W. S. Leckie, of Columbus, Ohio, is president and general manager, and his son, W. H. Leckie, Bluefield, W. Va., is assistant general manager. Mr. Coleman's headquarters are at Alex, Ky. E. F. Talbott is superintendent at Roseann.

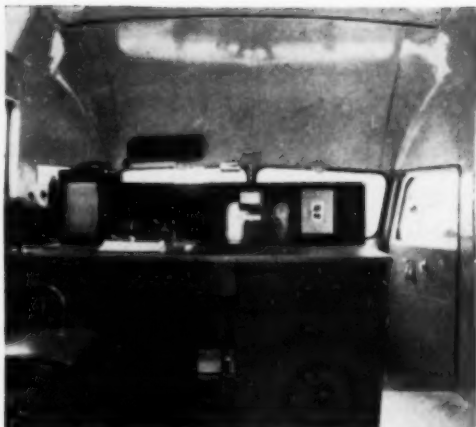


PAYROLL OFFICE, with W. A. Looney, clerk, seated at the open miners' payroll window, typifies the completely fireproof office.





**ELECTRO-MAGNETIC TESTER** consists of a main unit (right) connected by cable to a remote unit (center) set up close to the rope being tested. The test coil at the left encircles the rope.



**RECORDING EQUIPMENT** for the electro-magnetic tester installed in truck operated by the Nova Scotia Department of Mines. Charts (next page) show data obtained in tests conducted at coal mines.

## Better Rope Testing

**New Electrical and Mechanical Testing Units Make Possible Additional Checks on Hoisting-Rope Condition to Increase Life and Promote Safety — Among Four From Abroad, Three Operate Without Rope Destruction**

TO SUPPLEMENT conventional methods of determining hoisting-rope condition, new electro-magnetic and mechanical testers are being employed, particularly at mines abroad. In addition to promoting safety, these testers increase rope life by providing a better record of the forces affecting rope condition and by detecting certain types of internal corrosion and deterioration difficult to determine by the usual methods. How four of these testers work and what they show is described in the following material, taken from *Engineering and Mining Journal*, a McGraw-Hill publication for the metal and non-metallic field.

### Electro-Magnetic Testing

Immediately after a serious cage disaster in Ontario, which took the lives of 16 men in 1945, the General Engineering Co., of Toronto, Canada, began a series of tests to determine whether the Cyclograph, made by Allen B. DuMont Laboratories, Inc., Passaic, N. J., could be

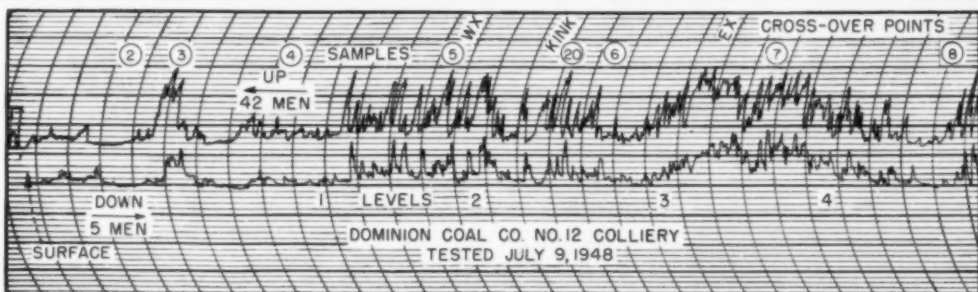
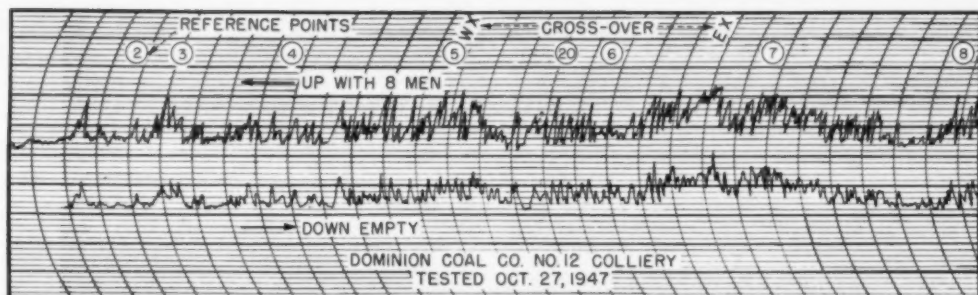
used to make non-destructive tests of hoisting ropes. Briefly, the Cyclograph makes use of the fact that the energy absorbed by a body in a field of a coil carrying an alternating current depends upon the material in the body and also upon internal structure and stresses in that material. Thus, the Cyclograph became part of a rope tester which provided a means of measuring and recording changes in the electro-magnetic properties of a hoisting rope under test. Early and subsequent tests with this equipment have been carried on in co-operation with the Ontario Research Foundation. Results have been very encouraging.

In practice, a more recent model of the rope tester is operated at test frequency which gives a continuously increasing reading with increasing stress in the rope being tested. Recordings are taken from time to time over the length of the rope at two known loads. The recordings will not by any means be a straight line, but so long as no increase in unit stress has occurred,

the recorder will produce the same pattern for the same rope at the same load. Any increase in reading at one point in the rope can only be a result of increased stress and produces a bump on the pattern which continues to develop as long as the stress increases.

The difference in height of such a bump at two known loads indicates whether the increase in stress causing it is the result of a reduction in the load-carrying cross-section of the rope or an increase in internal stresses from plastic deformation or damage. Thus, information revealed by the tester, if properly interpreted, can be used to reveal kinks, corrosion, deformation at cross-over points, and rope stresses from acceleration, deceleration, faulty hoist operation and defective shaft installations. In other words, the mine operator can now virtually feel the pulse of his hoisting rope and determine in advance what conditions are contributing to early rope deterioration and detect damage or deformation.

The equipment and hoisting technique as now developed makes it possible to secure accurate, reliable and duplicatable records of a given rope in practically any normal installation without dismantling any of the hoisting gear and usually without interrupting normal operations.



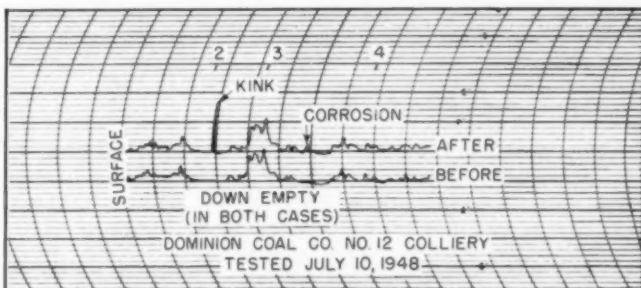
CHARTS RECORDED BY ELECTRO-MAGNETIC UNIT for the same rope at two different times show "bump" pattern revealing stresses in the rope while in use. Properly interpreted, the bumps can indicate progressive wear, damage or deterioration of hoisting ropes.

In field work carried on recently in Nova Scotia by W. Simpson, inspector, Nova Scotia Department of Mines, the equipment was mounted on a trailer. Equipment included the rope tester, an Esterline-Angus recording millimeter to record rope-test readings, and a similar recording wattmeter to record power input at the hoist. A selsyn drive is provided so that the paper in the recorders may be driven from the hoist or sheave in contact with the rope. Results of some of the field tests are shown in the accompanying charts.

The foregoing is based principally upon a report, "Electronic Rope Tester," published by the General Engineering Co. (Canada), Ltd., Toronto, Canada, prepared by P. E. Cavanagh and R. S. Segsworth, working in cooperation with the Nova Scotia Department of Mines.

### The Micro-Tensiometer

The micro-tensiometer, developed by British Ropes, Ltd., Doncaster, England, is another useful device for testing stresses in moving hoisting ropes. Chief value of this instrument is its ability to record momentary shock loads on hoisting ropes caused by guide misalignment, faulty guide shoes, accelera-



AFTER KINKING AND CORROSION, same rope previously tested (see charts above) was checked with the electro-magnetic unit. New bumps show kink and corrosion.

tion, deceleration and other factors. In one instance, an analysis of shock loadings revealed by the tensiometer enabled a company to double the life of ropes by correcting mechanical defects.

As shown in an accompanying illustration, the instrument consists of a frame, a steel bar supported against two fulcrum bars, five pulleys (three calibration and two deflection), a recording unit and a differential gear box. The three central pulleys are the calibration pulleys against which the rope must always travel so that its neutral axis is kept in the same place constantly.

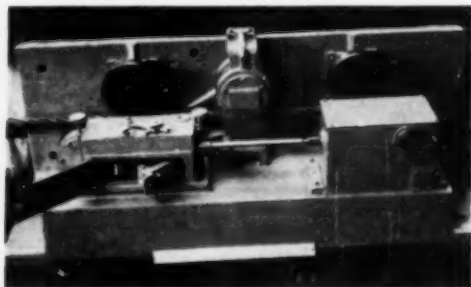
To insure constant rope travel through the instrument at the correct angle of deflection, an upward pressure is maintained by two outer deflecting pulleys which are raised to a point where any change in the rope's diameter does not alter the angle of deflection.

Of the calibration pulleys, two are fixed, but the center pulley is coupled to the center of the steel tension bar and is free to move in an upward direction. This movement is transmitted by a lever to a recording unit situated on the frame. Recordings are made on a celluloid film by a stylus, from which enlarged photographic rec-

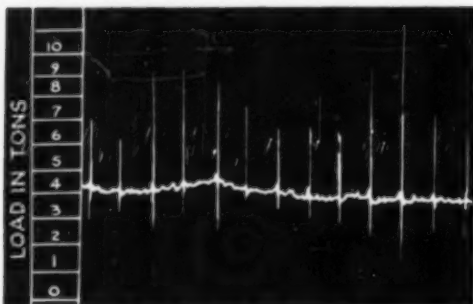
## How New Testers Provide Additional Data on Factors Affecting Ropes



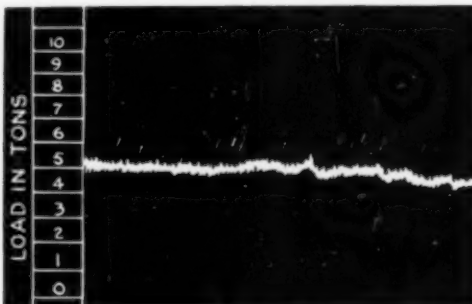
**MICRO-TENSIONETER** records momentary shock loads on hoisting ropes caused by guide misalignment, faulty guide shoes, acceleration and other factors (see chart below).



**MORE-RECENT MODEL** of the micro-tensiometer has an additional mechanism for driving recording film independently of rope travel and records time intervals of 1/10 sec.



**BEFORE**—Micro-tensiometer registers effects of plucking action of surge wheel on hoisting rope at a British colliery.



**AFTER**—Rope life doubled by eliminating factors causing shock, as shown by new test at same British colliery.

ords are obtained. This film is driven by a shaft from a differential gear box on the frame, the gears being driven by the deflecting pulley and the rope.

The center assembly is free to move in an upward direction, and this movement is only 0.0005 in for each ton tension in the rope. The moving assembly is as light as possible to enable sharp impact shocks to be registered accurately.

A more recent model of the micro-tensiometer now coming into use has an additional mechanism for driving the film independently of the rope travel and registering 1/10 sec time intervals on the film.

The micro-tensiometer is not sold to rope users, but is used by service engineers of British Ropes, Ltd. By arrangement the company will assist a customer to obtain a device for his own use.

### The Decelerometer

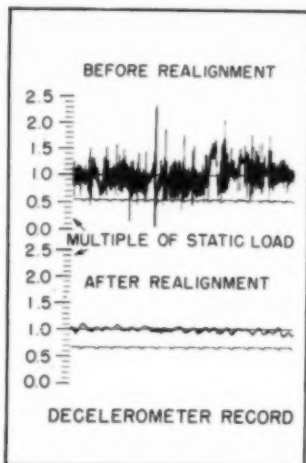
Another report issued by British Ropes, Ltd., on "Shaft Guide Reactions," and prepared by J. L. Kerry and H. Hitchen, AMIE, contains graphs showing the variable

forces imposed on hoisting ropes as recorded by the decelerometer. (See also "Winding Rope Reactions," H. Hitchen, *Trans., The Institution of Mining Engineers*, Vol. CIII, pt. 5). This device records information similar to that obtained with the micro-tensiometer.

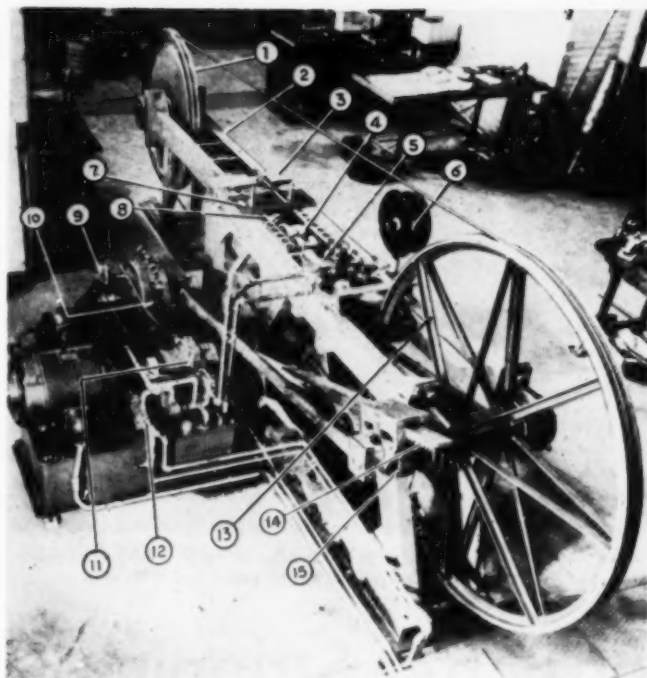
In one instance the short rope life of a shaft installation using wooden guides and steel shoes was found to result from misalignment of the guides. Decelerometer readings reproduced elsewhere in this article reveal how excessive these loads were and how they were eliminated by proper alignment of the guides.

### Ontario Testing Machine

The machine illustrated was designed to test ropes non-destructively. The unit is intended to duplicate working conditions as nearly as possible, and to test ropes under fluctuating loads—a unique and desirable feature since all hoisting ropes operate under variable loads. The work is being done by the Ontario Research Foundation under sponsorship of the On-



**TWO DECELEROMETER RECORDING** on rope in shaft with two wood guides and steel shoes show why ropes deteriorate excessively if guides are out of alignment and how mild the shock forces are if the guides are aligned properly. Lower line is divided into 1/10-sec intervals to indicate duration of shock loads.



### Parts of Wire Rope Testing Machine

1. Test or driven sheave.
2. Slide frame.
3. Main frame.
4. Dynamometer linkage.
5. Hydraulic cylinder and piston.
6. Oil pressure recorder.
7. Retainer block with removable pins.
8. Adjusting screw.
9. Cam actuated hydraulic valve showing cam mounted on reducer shaft underneath.
10. Drive motor and speed reducer.
11. Hydraulic unit: motor, pump, reservoir and relief valves.
12. Oil cooler.
13. Drive pulley.
14. Rack connected to speed reducer crank.
15. Pinion, meshing with Rack 14.

ONTARIO RESEARCH FOUNDATION employs this machine to test ropes non-destructively and duplicating working conditions as nearly as possible. Effects of fluctuating loads, sheave size, moisture, lubricants and corrosive forces on rope life will be determined.

tario Research Council (Wire Rope Sub-Committee of the Mines, Minerals, and Metallurgy Sub-Committee).

Problems of detail in design were worked out by the General Engineering Co. of Canada, Ltd., Toronto. The machine was built by Peerless Engineering Co., Ltd., of Toronto.

Essential parts of the machine include a test, or driven, sheave supported on a sliding frame. The drive sheave, corresponding to a hoisting drum, is supported on the main stationary frame. The drive sheave is driven by a motor and speed reducer through a rack and pinion which operates the sheave through one revolution in each direction every 6 sec. Sheaves are grooved for a  $\frac{5}{8}$ -in rope. This is passed over the two sheaves and makes two complete turns around the drive sheave before being fastened.

Tension is applied to the rope by a hydraulic cylinder which moves the sliding frame relative to the stationary frame, and thus tightens the rope. A dynamometer placed between the sliding and stationary

frames measures tensions applied to the rope and permits reasonably fine adjustment for experiments.

Rope tension in each cycle, which consists of one revolution each way, may be controlled by setting relief valves on the hydraulic cylinder. Thus tension on the rope may be kept constant or varied from a chosen value to half that value during each cycle.

The machine has been built to apply tensions varying from zero to 20,000 lb. Therefore, ropes can be operated under constant loads up to 20,000 lb. Maximum limit of the fluctuating loads would be from 10,000 to 20,000 lb in each cycle. As the machine is designed to test  $\frac{5}{8}$ -in ropes, which may have a nominal breaking strength of 30,000 lb, it is possible to apply loads up to two-thirds of the ultimate strength of the rope.

It is expected that this unit will reveal the following vital information about hoisting ropes:

1. Rope life under constant loads. In one experiment, a  $\frac{5}{8}$ -in 6x19 plow-steel rope lasted 4 to 5 days under a constant tension of 10,000

lb, and at 20,000-lb constant load, the life was one-third as long.

2. Effects of fluctuating loads on rope life.

3. Effects of moisture, acidity and lubricants on hoisting ropes (an atmosphere box can be attached to vary conditions).

4. Effects of pulley size, shape and size of rope groove, fleet angle, and various constructions on rope life.

Various instruments designed to measure stresses within an operating cycle are being tried out, including the DuMont cable tester previously described. The foregoing information on the Ontario rope testing device is presented through the courtesy of O. W. Ellis, director, Department of Engineering & Metallurgy, Ontario Research Foundation.

Other members active on the Sub-Committee on Wire Ropes include representatives of various wire and steel companies, the Ottawa Department of Mines, the Ontario Mining Association, International Nickel Co., Imperial Oil, Ltd., and the Ontario Department of Mines.



FIG. 1—CUTTING TRUCK-TIRE COSTS by carrying tire service to the pit is the job of this compressor-equipped pick-up truck.



FIG. 2—FIELD REPAIRS performed by this welding outfit reduce delays involved in bringing all work to the shop.

## Service for Better Stripping

Travelling Maintenance Units, Offices and Storerooms  
Provide Flexibility in Servicing Strip Equipment at Four  
Anthracite Pits of the Central Pennsylvania Quarry,  
Stripping & Construction Co.

SPECIAL-PURPOSE auxiliary vehicles and shop-made materials-handling aids promote full-time production of digging and hauling equipment at four anthracite strip mines of the Central Pennsylvania Quarry, Stripping & Construction



FIG. 4—LIGHT CRANE, ready for work on short notice, results when shop-made A-frame is installed on tractor as shown at left. Photo at right shows tractor winch rope passed over A-frame sheave. Lift is controlled from cab by tractor operator.



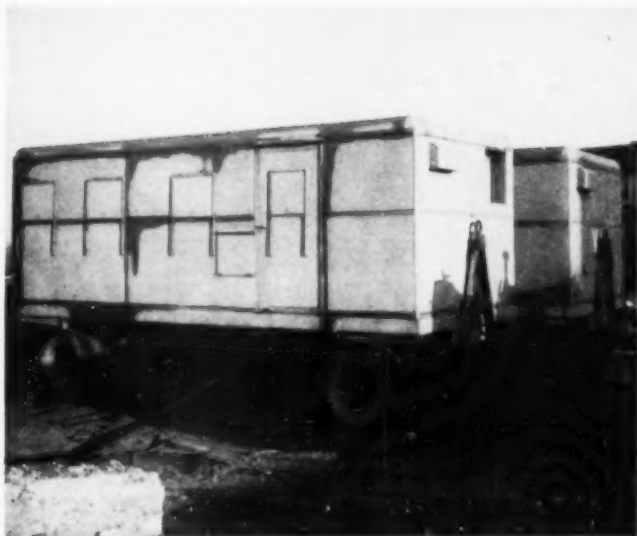


FIG. 3—PORTABLE OFFICES and supply-rooms help in controlling company activities at distant pits. Lighting and heating fixtures permit all-weather use.

Co., Hazleton, Pa. These operations of the company are within an 18-mi radius of Hazleton, with maintenance and field repairs controlled and coordinated from the central shops in Hazleton.

Spoil and coal are hauled from the various pits by a fleet of 60 Euclid dump trucks with capacities of 10 and 18 cu yd, all operating off the highway. Truck-tire maintenance was a pressing problem in view of haulage conditions in the

pits until the company placed a tire-maintenance truck in service. This truck (Fig. 1), equipped with a gasoline-powered compressor and a set of tire tools, has been in service two years and has received the unqualified approval of company officials. Savings in tire repair costs have mounted steadily since its introduction.

The sole duty of the tire-truck driver is to check tire condition on haulage units. He maintains tire

pressure at recommended levels, inspects sidewalls for cuts and bruises, guards against tire-slip on the rims and inspects valves and stems for defects. His schedule permits two inspections of each tire per week. A daily report on the condition of tires inspected during that day is submitted to the shop office and remarks on this report are transferred to the filed records of the individual tires. A company number, branded on each new tire in the order of its purchase, helps in making field inspections and recording the information in the office. These tire records indicate a marked increase in tire life since the service truck was placed on the job.

Drivers of the large trucks have been impressed by this extensive tire-maintenance program and are now helping the cause by inspecting their own vehicles and reporting tire defects. Sidewall damage resulting from rocks wedging between dual tires has been reduced by these driver inspections. The ultimate goal of this program is to reduce tire costs to controlled replacement purchases after each tire has given the maximum service possible.

On week-ends and other idle days the compressor on the tire truck is fitted with a paint-spray attachment for dressing the pit equipment to prevent corrosion. Shovels and other large items of equipment not readily shopped are thus painted periodically with a minimum of lost time.

Field repairs requiring welding or cutting are done by the crew of



FIG. 5—DESTINED FOR HARD SERVICE in hauling rock overburden, a truck bed is reinforced with angles welded in place, as shown at left. Reinforcing plate, welded to canopy and bolted to sideboard, as shown in photo at right, adds strength to canopy.

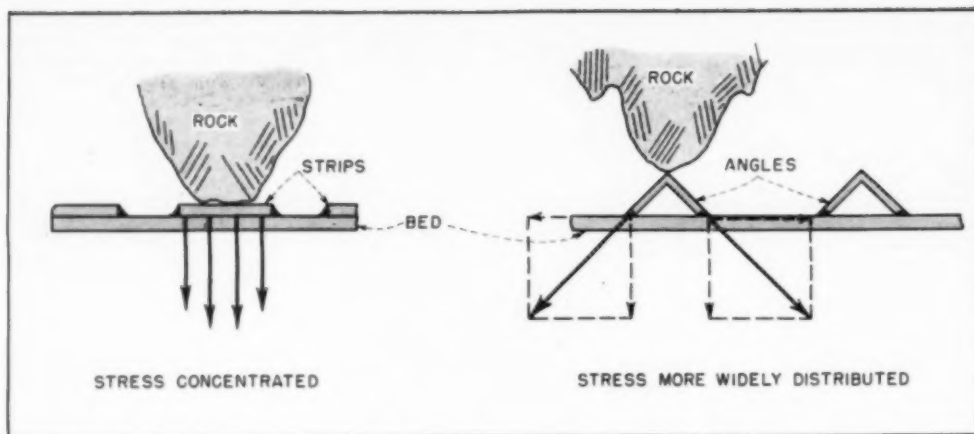


FIG. 6—SUPERIORITY OF ANGLES as reinforcement is a result of better stress-distribution in transferring shocks to the bed. Bed abrasion is reduced as large rock "bridge" adjacent angles during dumping. Angles have outlasted steel strips on the job.

a repair truck equipped with a 400-amp welding outfit and oxyacetylene cutting equipment (Fig. 2). Built-in racks on this truck carry a supply of rods to cover any application within the capacity of this generator. Shop-made C-clamps and jigs for holding the work during welding are also carried in the truck. Emergencies are handled in the field through this arrangement and only scheduled welding jobs are performed in the central shop.

These two special-purpose trucks, serving as traveling maintenance units, help keep production equipment operating with minimum delays from breakdowns and tire failures.

War-surplus trailers converted to portable offices and parts-supply rooms by the company's shop force are shown in Fig. 3. Eleven of these trailers are used by the company in its stripping and highway-construction activities—seven as field offices and four as parts-supply rooms. Such trailers, when used as offices, are equipped with lead-in switch boxes and drop-cord outlets for lighting, air ducts for use with auxiliary heaters, and fans to heat or cool the interior, plus appropriate office furniture bolted to the floor. These offices are suitable for day-and-night all-weather use. Parts-supply trailers are lined with bins for planned storage and distribution of small parts for trucks and shovels.

A shop-made A-frame, shown in Fig. 4, and installed on a tractor used in heavy-equipment hauling, quickly converts this tractor to a light crane. Constructed with 6-in

channels as side members and 1-in pipe as webbing, this crane unit has a proven lifting capacity of 4 tons. The A-frame is stabilized by a 3-in pipe nested in a 4-in pipe between the top of the frame and the base of the tractor winch, as shown. Holes in these pipes, with throughpins to fit the holes, provide adjustability in setting the angle of the A-frame or in adapting it to trucks of longer wheelbase. The tractor winch rope is passed over the A-frame sheave for lifting purposes and the lift is controlled from the cab by the tractor operator. The resulting crane possesses the speed and maneuverability of a short-wheelbase vehicle of this type.

#### A-Frame Quickly Installed

Installing or removing the A-frame is easily done within 15 min. The crane is used primarily by the maintenance men to handle shovel parts in the storage yard and to unload bulky cargo from railroad cars. However, it was employed very effectively at a West Virginia stripping operation by the company to assist in unloading parts for a 6½-cu yd shovel from flat cars.

A new dump body for a haulage truck is shown in Fig. 5 in the process of being treated to limit body-damage from large pieces of rock overburden being dropped into the bed. This preliminary treatment consists of welding 2½x2½x½-in angles to the floor of the dump body as indicated. The use of angles instead of steel strips was decided on by company officials after observation of the two sections in

service indicated that angles provided the desired bed protection for longer periods. Arguments in favor of the angles are shown in Fig. 6, which suggests that concentrated loads are distributed laterally—at least to some extent—by the angles. Also, most of the abrasion is absorbed by the angles since large pieces of rock will "bridge" adjacent angles and not touch the floor.

Angle sections are bent longitudinally to conform to the shape of the floor by jacks working against an I-beam across the body and clamped to the sideboards at each end. The vertical studs shown in Fig. 5 are bolts that have been spot-welded to the floor. They are used in conjunction with a yoke to draw the angles into close contact with the floor prior to welding these angles in place permanently. The open ends of the angles are closed by triangular plates welded in place to keep out fines and moisture. The canopy is reinforced at the sides, as shown, by bolting ½-in steel plate to the sideboards of the body and welding it to the canopy.

The auxiliary vehicles and shop-made aids described here have proved valuable to the company in long-term application. They are the result of constant examination of existing practice with a view to improving methods of operation and equipment servicing.

W. C. M. Butler is president of the company, and C. T. Butler is vice president in charge of coal operations. Walter Evans is general superintendent of the shops in Hazleton, where these production aids originated.

# EXIDE-IRONCLAD BATTERIES ARE DIFFERENT!

Specially designed to provide dependable power for  
MINE LOCOMOTIVES, SHUTTLE CARS, TRAMMERS

Storage batteries are called upon to perform many tasks. No single type of battery is adequately suited to all. To meet these numerous requirements, Exide engineers have developed special types, to fit each application. Among these several types is the specially designed Exide-Ironclad Battery. Details shown below.

**VENT PLUG** specially designed to prevent escape of electrolyte.

**GREASE SEAL RING NUT** holds battery elements securely in place . . . prevents seepage of electrolyte . . . keeps tops clean and dry.

**SEALED CELL COVER** flush with top of jar. Prevents collection of dirt or moisture . . . keeps impurities out of cell . . . eliminates leakage of electrolyte.

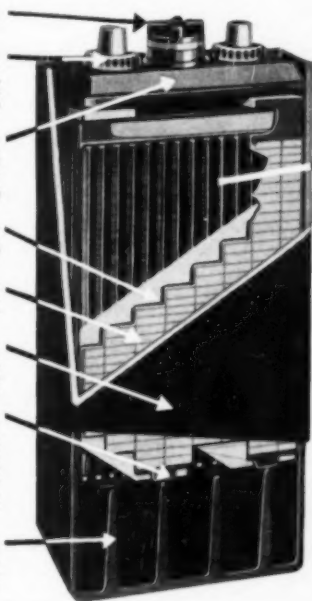
**SEPARATOR** of high porosity, specially treated to last the life of the battery.

**NEGATIVE PLATE** made extra heavy and built to match the long life of the positive plate.

**JAR** made of specially tough and durable Giant Compound. Built to withstand the jolts and jars of hard industrial usage.

**FEET**. Internal short circuits practically eliminated because the two feet on negative plate rest on different ribs from those of the positive plate, and because separator extends below both plates and rest on all four ribs.

**RIBS** support all plates and separators. Their height provides generous sediment space so that internal cleaning is unnecessary.



## DIFFERENT IN DESIGN DIFFERENT IN CONSTRUCTION DIFFERENT IN SERVICE QUALITIES

Chief among these differences is the unique positive plate, an exclusive Exide feature.



### EXIDE-IRONCLAD POSITIVE PLATE

Consists of a series of finely-slotted tubes which contain the active material. So small are these slots that, while permitting easy access of electrolyte, they retard the active material from readily washing out or jarring loose . . . adding considerably to life of plate.

Exide-Ironclad Batteries have ALL FOUR of the characteristics that a storage battery must have to assure maximum performance from mine locomotives, trammers and shuttle cars—high power ability, high electrical efficiency, ruggedness and a long life with minimum maintenance. The combination of these four Exide-Ironclad characteristics assures years of dependable day-in, day-out service.

## SAFE DEPENDABLE POWER



"Exide" and "Exide-Ironclad"  
Reg. Trade-marks U. S. Pat. Off.

### DESIGNED FOR STATIONARY USE

The Exide-Manchex Battery has the manchester type positive plate with the lead button construction. Specially designed for stationary use in many classes of industry.

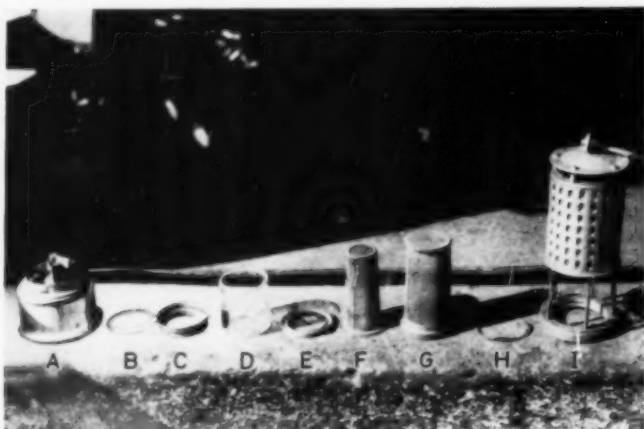
### DESIGNED FOR AUTOMOBILE USE

The Exide Automobile Battery has plates of staggered grid construction. Specially designed for use in automobiles, trucks, buses, aircraft and numerous other applications.



1888...DEPENDABLE BATTERIES FOR 61 YEARS...1949

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto



GOOD CONDITION OF LAMP PARTS and testing know-how promote safe, dependable gas-detection as the keys in . . .

## Protecting Permissibility Of Flame Safety Lamps

A LIFE SAVER or a weapon—your flame safety lamp can be either, depending upon how you maintain and use it. Recognizing this fact, the U. S. Bureau of Mines arranged a series of tests to determine the ability of various lamp designs to detect the presence of methane safely under extreme conditions. Upon being subjected to such tests and found effective, a lamp is rated as "Permissible" by the Bureau. However, two conditions are placed on this rating. They are:

1. Any lamp bearing the seal of permissibility must be an exact duplicate of the tested and approved model, with all parts in good condition.

2. The lamp must be used by a competent person.

Let's use these two requirements as a basis for a review of safety-lamp construction and application.

The accompanying illustration shows the component parts of the lamp, arranged from left to right in the order of their position in the lamp.

Fount (A) is the fuel chamber and contains cotton packing to absorb the

fuel and present it to the wick on demand. The fuel is low-sulfur naphtha specified for the purpose. The fount also holds the wick, wick tube, adjusting screw and igniter. Some lamps employ a baffle ring on the fount to control the underfed air.

Asbestos gasket (B) forms a fire-proof airtight seal between the metal and glass parts of the lamp.

Lower gauze or admission ring (C) permits underfed air to enter the lamp.

Glass globe (D) affords maximum illumination and a good view of flame characteristics when testing.

Second asbestos gasket (E) seals the top glass-metal junction. Some lamps use a steel retainer to hold and protect the gasket, as shown.

Inner main gauze (F) prevents flame from leaving the lamp but permits ventilation to proceed.

Outer main gauze (G) reinforces the functions of the inner gauze. This double-gauze feature also helps to prevent flame escape by hindering the products of combustion to a slight degree, thus making them serve as a

non-combustible cushion against flames and internal explosions.

Expansion ring (H) compensates for the difference in the rates of expansion of glass and metal on heating.

Frame and bonnet assembly (I) protects gauzes and glass, adds strength to the lamp and controls ventilation of the flame. The lamp's magnetic lock is housed in the lower ring of this frame and engages slots in the thread ring on the front when the lamp is assembled.

These, then, are the main functions of the various parts of the lamp, and it may be well to itemize some of the defects that will destroy the effectiveness of these parts.

1. Improper fuel may contain impurities that will corrode the metal or gum the wick. A smoky flame will result.

2. A broken spring, loose flint or missing set screws in the igniter will prevent its functioning. Test this part as soon as you assemble the lamp or receive it from the lamphouse attendant.

3. Holes in the lower gauze or damage to the admission ring may provide unprotected openings through which flame will travel to the outside atmosphere.

4. Broken gaskets may also provide unprotected openings.

5. Nicks, cracks or holes in the globe should cause its rejection for the same reason. Destroy damaged parts so that no one else can use them.

6. A flattened expansion ring will serve no good purpose in the lamp. It should be corrugated.

7. The main gauzes are the backbone of the lamp. Any punctures or enlarged holes in the mesh of these parts will most likely pass the flame of an internal explosion on to the mine atmosphere. Check gauzes carefully. Be sure they are clean because deposits of soot will insulate the metal and reduce its cooling effect on attacking flames.

8. The bonnet and frame assembly are designed to prevent damage to the globe and gauzes. The bonnet is the punched metal cover surrounding the upper part of the lamp, and the ports in this bonnet control the ventilation of the lamp. Dirt or other obstruction in these ports may hinder ventilation and cause overheating of the gauzes and unsteadiness in the

MINE  
LUBRICANTS

MARATHON

V.E.P. OIL



## How to get 6 hours' engine work with only 4 hours' engine wear

**CHANGE TO MARATHON V.E.P. OIL. MAKE ENGINES LAST  
50% LONGER THAN THEY WOULD WITH ORDINARY OIL\***

\*Not just a claim. Scientific tests prove it. 12 years of on-the-job experience in gasoline and Diesel engines confirm it: V.E.P. actually makes engines last 50% longer than

they would with ordinary oil, do 50% more work between overhauls. Sound like a good way to cut operating costs? Write or wire. Let our mine lubrication engineer *show* you.

Different. Patented. Marathon V.E.P. is the pioneer, heavy-duty oil with these wear-saving extras:

• **TRIPLE-PLUS FILM STRENGTH** gives more than 3 times as much protection as ordinary oil against heat, pressure, shock.

• **CONSTANT CLEANING ACTION** keeps valves and rings free, oil holes and lines open. (Saves fuel, conserves power.)

• **"MAGNETIC - LIKE" FILM** prevents damaging "dry" starts. Stays put at high temperatures. Protects bearings against corrosion.

A COMPLETE LINE OF MARATHON LUBRICANTS FOR EVERY OPERATION IN YOUR MINE

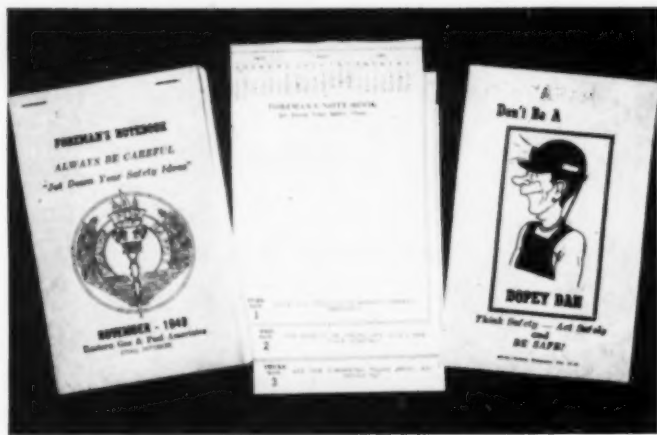


## THE OHIO OIL COMPANY

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### Foreman's Notebook an Ever-Present Safety Reminder

DAILY SAFETY REMINDERS are a feature of this handy Foreman's Notebook furnished to supervisors of the Coal Division, Eastern Gas & Fuel Associates. Front and back covers, shown left and right, are made of heavy colored paper, and the inside of the book, center, provides daily pages for pertinent notes, a three-month calendar and the safety reminders. The notebook represents another aid in the accident prevention program of the company.

flame. Overheated gauzes will not confine internal explosions effectively, so keep the ports in the bonnet open.

In general, gauzes, globe and asbestos gaskets are the most fragile parts of the lamp. They are not expensive, and your company will be more than willing to furnish replacements if you have good reason for believing such parts in your lamp are defective. Don't take chances—new safety-lamp parts are available in your lamphouse.

Lamp service and inspection at most mines is the responsibility of a few well-chosen lamphouse attendants. This practice promotes increased safety for everyone in the mine. Training and supervising one or two men in these duties is more effective than trying to check the condition of every lamp in the mine after assembly by the individual user. Lamphouse attendants are chosen for dependability and trained for their work. They do a good job. However, you should check your own lamp personally upon receiving it at the beginning of a shift. You will be certain of its condition if you do.

A definite inspection routine which you can perform, whether the lamp is self-assembled or not, will answer the following questions to your satisfaction. Are all the parts included (you can see every part of a locked lamp except those in the fount)? Is the exterior of the lamp dry of excess fuel? Does the wick operate freely? Does the igniter work? Is the flame clear and steady?

If a baffle ring is used on your lamp is it right side up? Is the admission

ring in good condition? Are the asbestos gaskets properly placed? Is the globe intact? Does the expansion ring retain some of its corrugation so that it will operate properly? Are the frame, bonnet and hook in good condition? Make this inspection of your own lamp and remind your men to check theirs so that a defective lamp will never be brought into your section or mine.

The second requirement for continuing permissibility stipulates that the lamp be used by a competent person. A perfect lamp may be a hazard if it is used improperly. Every lamp user is responsible for his own safety and that of his fellow-workers, and should strive to become proficient. This competence will come with training and experience in safety-lamp use, and you, as a foreman, will be charged with the responsibility for properly training your men. Neglecting this training may result in serious burns or worse, for the men; or in embarrassment for you if an official visitor in your section notices a laxity in safety-lamp discipline.

Look for errors and poor practices and correct them on the spot. If you find a lamp setting on the bottom, see that it is hung properly. Make certain that every lamp carries a flame of proper height. See that tests for methane are made before and after shots, before starting electric equipment in the face, and periodically during cutting.

Experimenting with a body of methane in an effort to determine percentages is a poor policy. A lamp heats rapidly in the presence of

methane and may become dangerous. The lamp is primarily a detecting agent to determine the presence or absence of gas only. Non-flame-type detectors will indicate methane percentages accurately and safely. In all these training efforts don't forget the man who may not use a lamp now but may have that responsibility at some future time.

You realize that your use of the lamp is governed by an intelligent estimate of the situation as you find it from day to day in your section, with due regard for emergencies that could occur. You know that you must exercise judgment in every test you make so that your conclusions as to the presence or absence of methane will be correct. This is the degree of safety-lamp proficiency you want your men to acquire. If gas is present in determinable amounts they should see it in their lamps, and if it is not present they should be certain of that fact.

The necessity for strict adherence to safety rules is highly important in coal mining because of natural hazards. The presence of methane in coal seams is one of these dangers that is augmented by mechanized recovery methods. Fresh coal is exposed more rapidly and methane introduced into the workings accordingly. This condition demands constant alertness on the part of all mine workers, with special attention to the condition of safety lamps and their employment as gas detectors. Study your section problems in this respect, plan your program to prevent accidents from gas ignitions, and then give all your men the benefit of your study and plans.

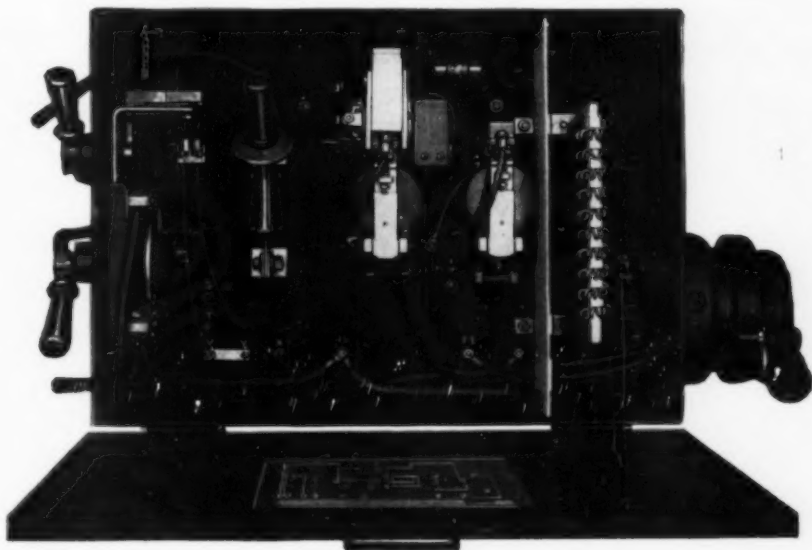
### Have You Ever Noticed

1. That nearly every time a brakeman falls from a moving trip he sprains an ankle or bumps his head.
2. That a timberman drops a post on his foot when he trips over loose coal and slate on the mine floor.
3. That a man who uses a wrench that does not fit skins his fingers.
4. That when you are in the right position and bend your knees to lift with your leg and thigh muscles, less effort is required.
5. That track not ballasted and surfaced will cause wrecks involving men, locomotives and mine cars.
6. That a machineman under a roof jack gets hit by it when it falls.
7. That all benefits resulting from safe practices prevent injuries to workers.

Such cause-and-effect relationships are familiar to everyone—so familiar, perhaps, that some workers forget to remember them. That's where the good supervisor can help—by constantly teaching and showing his men how safe work practices eliminate the causes of many accidents.

—Adapted from the  
Armco Safety News Letter

# DROWNED FOR FIVE DAYS-



## Yet the O-B Starter is Ready for Work

Five days completely submerged in mine water—and no damage done. Nothing to replace, nothing to be dismantled and baked dry.

That was the recent experience of a southern mine with an O-B Type-BD Motor Starter. One section of the mine flooded, covering all the equipment, including a BD Starter. Five days later the section was pumped out and the electrical equipment was taken out.

Everything had to be baked for several days before the equipment could be used

—except O-B's BD Starter. It was allowed to dry normally for a few hours and put right back into service.

We certainly don't recommend this kind of a bath as standard practice for O-B Motor Starters. But it does prove once again that the simple, rugged construction of O-B Starters really stands up under hard mine service.

O-B Motor Starters are available in both gasproof and open types. Write for complete information.

3018-M



**Specify O-B Motor Starters For All Motor-Driven Equipment—They're Designed to Stand Up Under Heavy Mining Service.**

**Ohio Brass**

MANSFIELD, OHIO  
CANADIAN OHIO BRASS COMPANY, LTD.  
NIAGARA FALLS, ONTARIO

# Operating Ideas



HOOKS ON CHECK BOARD face lamp-room before shift reports for work. C. Horn, lamp-man, issues lamps after receiving checks.



HOOKS FACE LOBBY when board is reversed near end of shift. Minnie R. Street takes his check off the board and turns in his lamp.

## Reversible Check Board Speeds Lamp Issue and Check-in

CONFUSION AND MISTAKES in lamp issue and check-in were eliminated at No. 5 mine of the Crystal Block Coal & Coke Co., Roth, Va., through the use of a reversible lamp-check board.

Each lamp is numbered, and the miner to whom a particular lamp is assigned is given a numbered check

corresponding to the number on his lamp. Upon reporting for work he hands the check to the lamp-man, who gives him the assigned lamp and hangs the check on the board, then facing into the lamp-room.

Near the end of the shift, the lamp-man reverses the board in the panel so that the hooks face the lobby. Men

coming off shift place their lamps on the bench and take their own checks from the board. This system assures each man of getting his assigned lamp every day.

The lamp checks are not life checks. The latter hang on a board in the lobby and are taken off and carried by the men while in the mine.

## Winter Reminders for Truck Owners and Operators

SEVERAL STEPS in preparing trucks for winter driving have been suggested by I. L. Pierce, national service manager, Ford Division, Ford Motor Co., as follows:

1. Thoroughly check the cooling-system lines and connections for leaks so that antifreeze solution will not be lost.

2. Flush the system to remove sludge and dirty water which prevents free circulation.

3. Keep the battery fully charged and recharging. A fully charged battery will not freeze in temperatures ordinarily encountered, but a low battery may freeze and burst the case at temperatures not much below 32 F. See

that the generator and regulator are working properly.

4. Drain the crankcase and refill with the correct grade of motor oil for the coldest weather expected during the winter. In extreme cold (under 10 below zero) add a pint of kerosene to the oil in the crankcase.

5. Change to winter grease in transmission and differential.

6. Have the brakes and tires checked to insure smooth braking and good grip on icy roads.

7. Drive slowly until the engine reaches correct operating temperature.

8. Keep the fuel tank full as much of the time as possible to help pre-

vent condensation of moisture and resultant freezing of the gas line. Fill up at the end of each day, rather than at the start.

## How About Yours?

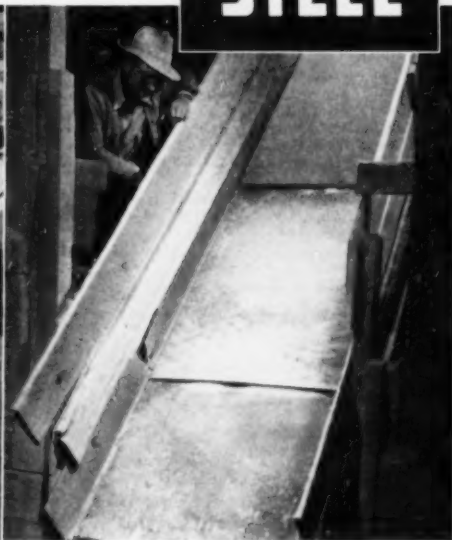
**AS YOU READ** this section every month, you may often recall a good operating, maintenance, safety or electrical idea you successfully put to work. Why not send it on to us? It will take only a minute and **COAL AGE**, on publication, will gladly pay you \$5 or more for each acceptable idea. Write us today!

# CHUTE COSTS CUT 66% AT STUART M. PERRY COMPANY WITH J&L JALLOY HEAT-TREATED STEEL PLATES

## J&L STEEL



In Perry's primary crusher J&L heat-treated JALLOY plates lasted ten times longer than mild steel under a daily pounding by 700 to 800 tons of blue limestone.



Shaker tailing chutes receive severe sliding abrasion.  $\frac{3}{16}$ " J&L plates lasted 22 weeks in this application—7 times service life of mild steel.

### Lower Maintenance . . . Longer Service Life Result in the exclusive use of J&L JALLOY on all chutes at stone crushing plant.

The Stuart M. Perry Company, quarrymen, of Winchester, Va., has turned to J&L JALLOY heat-treated steel to provide more efficient chute liners. Perry found that JALLOY plates last four to twenty times longer than mild steel.

The result—"JALLOY steel has cut my chute costs by two thirds." That's what Thurman Perry, supervisor of the Stuart M. Perry Company, had to say about the JALLOY steel he ordered from William G. Wetherall, Inc., Baltimore, Md.

But more specifically here's how J&L JALLOY reduced Perry's maintenance costs:

- Used as a grizzly plate in the primary crusher—JALLOY lasted 5

months—10 times longer than mild steel—Saved 44 man hours per JALLOY installation.

- As the bottom chute in a 3 ft. Symons Cone Crusher—JALLOY was still in operation after 16½ months—four times the life of mild steel.

- As the head chute from the bucket elevator—JALLOY lasted 16 months—20 times the life of mild steel—Saved 80 man hours labor.

- As a shaker tailing chute—JALLOY lasted 5 months—7 times longer than mild steel—Saved 72 man hours labor.

J&L heat-treated JALLOY, a fine grained, manganese-moly steel, has a yield strength of 160,000 lbs. per sq. inch and a Brinell hardness of 341 to 388. It is available in the form of bars and in plates up to 72"

wide and 20' long, with thicknesses from  $\frac{3}{16}$ " to 1½".

Although twice the price of mild steel, JALLOY'S long life saves money in applications where impact and abrasion are severe such as: conveyors, crushers, scrapers, bulldozers, power shovel buckets, dump cars, and heavy-duty truck bodies.

Write for the booklet "JALLOY—J&L Alloy Steel." It contains information on properties, heat-treating, and the workability of this modern steel. The coupon is for your convenience.

Jones & Laughlin Steel Corporation  
411 Jones & Laughlin Building  
Pittsburgh 19, Pa.

Please send me your data booklet:  
"JALLOY—J&L Alloy Steel."

NAME

COMPANY

ADDRESS

Do you recommend J&L JALLOY Steel  
for:

## JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLLOV and JALLOY (hi-tensile steels).

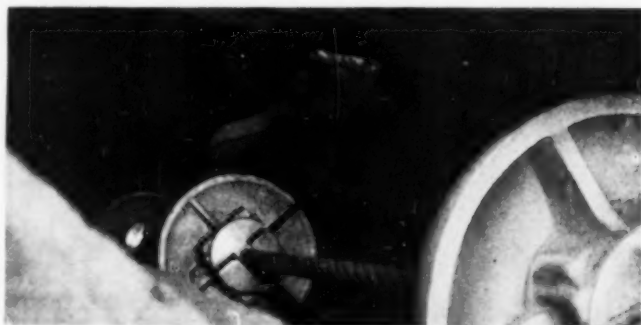
PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

## Safety Dogs Prevent Damage From Broken Conveyor Rope

PRIOR TO INSTALLATION of non-return safety dogs along the top or empty run of the rope-and-button retarding conveyor at No. 5 mine of the Crystal Block Coal & Coke Co., Roth, Va., a broken rope caused damage which in some instances kept the tippie down for two shifts. Now a broken rope will cause only about 2-hr delay, which is the time required to splice the rope.

As illustrated, the safety dog is forked to straddle the rope. It is hinged to swing in one direction only, permitting buttons to push it out of the way during normal operation but providing a back-stop for these buttons if the rope should break. Five of these stops were installed, one near the top of the conveyor and the others equally spaced over the 796-ft conveyor-length.

Pitch of the conveyor is not so steep that the lower or loaded rope slides down far enough to do great damage



DEFLECTED BY BUTTONS as the conveyor operates in the normal direction, safety dog prevents back-slide by holding a button if the rope breaks.

in case of rope breakage. However, a V-notch stop was installed below the top sprocket to catch one of the but-

tons if the rope breaks at the sprocket. This limits backslide of the rope to a few feet.

## How to Use and Maintain Hydrometers

THE BATTERY-MAN should guard the well-being of his equipment just as the trained mechanic takes pride in caring for his tools, according to the Gould Storage Battery Corp., Trenton, N. J., which offers these tips on hydrometer use and maintenance.

Perhaps the most important tools in the battery room are the hydrometer and thermometer. They indicate the state of charge of a battery and whether it is ready to do a day's work.

The care of these tools is simple. It requires that they be wiped dry and returned to their assigned place after use. They should be kept clean to prevent foreign material entering the battery. Occasionally, the hydrometer should be taken apart, the float and the inside of the barrel cleaned, and the float examined for defects.

The correct use of the equipment is as important as its care. In using the hydrometer, the rubber nozzle is placed into the battery vent opening and enough electrolyte drawn into the barrel to permit the float to ride freely, not touching the barrel at any point. The hydrometer is held in a vertical position and read with the eye level at the electrolyte mark. If the hydrometer must be removed from the vent for reading, the nozzle should be pinched tightly or a gloved finger placed against the opening to prevent dripping of electrolyte. The float scale is read at electrolyte level, disregarding the curvature of the liquid.

Correction of specific gravity must be made on the basis of plus or minus 3 points of gravity for each 10-deg-F interval between electrolyte temperature and the base temperature of 77 F.



LONG LIFE AND GOOD SERVICE in industrial batteries depend on proper maintenance. Correct hydrometer use is an important factor.

This correction is necessary to obtain accurate specific-gravity readings. As the temperature of the acid rises, the acid expands and is not as dense. The float then rides low, giving readings lower than actual. Conversely, when the acid is cold the float rides high and the reading is higher than actual gravity. The following are examples of how this correction factor is applied:

Hydrometer Reading	Thermometer Reading	Correction	True Sp. Gr.
1.250	87 F	Plus 3	1.253
1.210	80 F	Plus 1	1.211
1.180	64 F	Minus 4	1.176

Specially designed battery thermom-

eters are sealed to permit ready correction of gravity readings. Adjacent to the regular temperature scale is a second column of figures, preceded by "plus" signs above 77 F and "minus" signs below. Reading the figures at the mercury level shows the amount of correction necessary. Thus, if the hydrometer reading is 1.260 and the second scale on the thermometer indicates plus 3, the true gravity is 1.268.

New hydrometers should be washed before use to prevent packing material and other foreign matter from entering the electrolyte. In unpacking, be sure to check all parts carefully for breaks or cracks.



FOR FAST, EFFICIENT TRANSPORTATION—SPECIFY

# HAMILTON KING KOAL

CONVEYOR  
BELTING



- KING KOAL belts have the ability to meet the varying requirements of entry, gathering, mainline, slope and preparation of plant installations.
- You don't need to worry about mildew or damp rot.
- You can produce to capacity without fear of belt breakage due to severe impacts and heavy loads.
- In short, KING KOAL belts can, and will, give you uninterrupted, maintenance free performance when the going is tough and loss of time is costly.
- Our claims are based on years of proven performance.
- Why not call in a Hamilton sales engineer to discuss your belt problems and requirements.
- Thorough service and prompt delivery are assured.

WE WILL GLADLY SUBMIT  
A SAMPLE UPON REQUEST



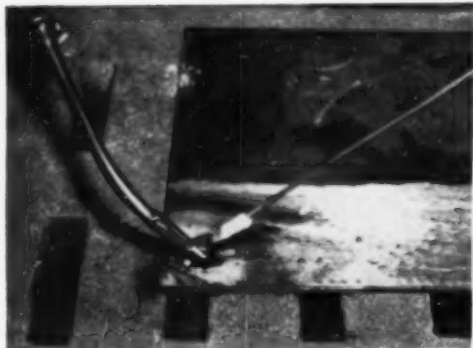
## HAMILTON

## RUBBER MANUFACTURING CORP.

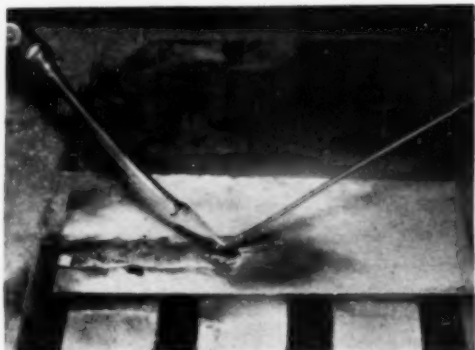
TRENTON 3, NEW JERSEY

NEW YORK — CHICAGO — HOUSTON — LOS ANGELES  
SAN FRANCISCO — CLEVELAND — CINCINNATI — PITTSBURGH

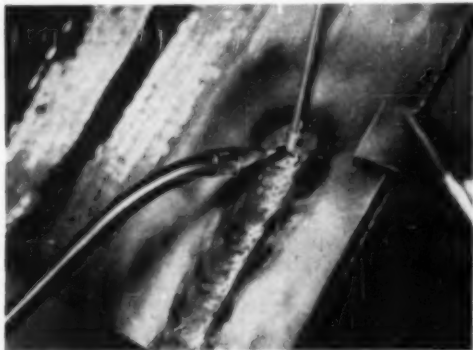
## Six Practical Hints for Good Bronze-Welding



**1 THOROUGH CLEANING** is one of the secrets of a good bronze-weld. Remove all oil, grease, scale, rust or oxide from the part you are going to weld. Heat the metal only until it turns a dull red.



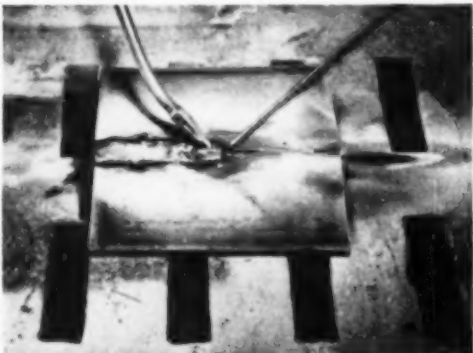
**2 HEAT THE WELDING ROD** at the same time and dip it in the bronze-welding flux. Melt the rod and it will spread smoothly and evenly on the metal. This is tinning.



**3 BUILD A SLIGHT SHELVE** of rod material when you weld on an incline. If the weld is not hot enough the rod will form into drops. If it is too hot the rod will boil and form small balls.



**4 PROPERLY DEPOSITED** layers of bronze look like this. For welding in the flat position, as shown here, hold both the blowpipe and the rod at an angle of 45 deg to the workpiece.



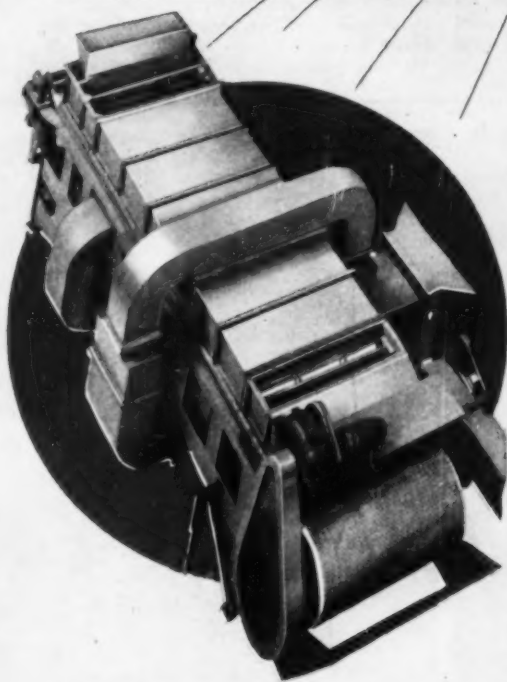
**5 BUTT-WELDING**, like this, requires a deposit of weld metal in the bottom of the joint for from 1 to 1½ in. Then go back and deposit the finishing weld. Be sure there is good tinning.



**6 FILLET-WELDING** requires advance tinning and welding for about 2 in and then going back and building up to the proper height. Direct the inner cone of the flame against the bottom plate.

Adapted from *Linde Tips*, Linde Air Products Co., October, 1949.

# Here's why the *Spotlight* is on the *Heyl+Patterson* **THERMAL DRYER**



*The H & P Thermal Dryer is a new, unique but practical method of drying stoker size coal. We would like to take you back of the scenes and show you what makes it tick. Write now for complete information.*

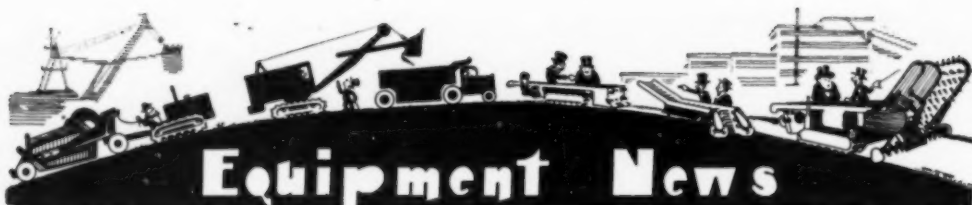
Ore Bridges  
Railroad Car Dumpers  
High Lift-Turnover-Rotary  
Coal Preparation Plants  
Coal & Coke Handling Equipment  
Belt Loaders and Unloaders  
Rotary Mine Car Dumpers  
Coal Crushers  
Coal Storage Bridges  
Car Hauls & Boat Movers  
Bradford Breakers  
Refuse Disposal Cars  
Thermost Coal Samplers  
Klimax Car Unloaders  
Pig Iron Casting Machines

**Heavy Bulk Materials Handling Equipment  
All the Way from Design to Erection**

***Heyl+Patterson, Inc.***  
"SINCE 1887"

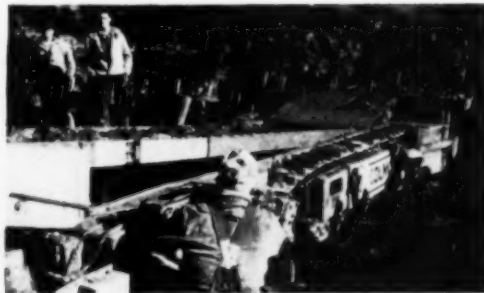
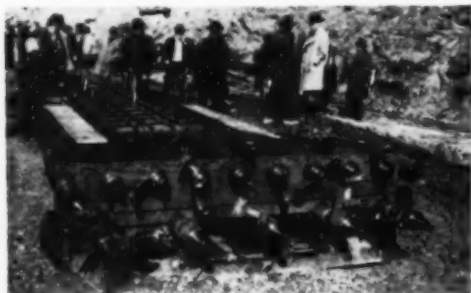
55 WATER STREET • PITTSBURGH 22, PA.

- 1** It will dry stoker size coal in one Dryer.
- 2** It will dry the bed thoroughly without burning the surface particles because of the two-pass principle.
- 3** It will simplify plant design and cost.
- 4** It will reduce operating and maintenance cost.
- 5** It will keep your customers satisfied by providing a uniformly dry product.
- 6** It will put more dollars in your till because . . . new markets can be found . . . for your uniformly dried product.

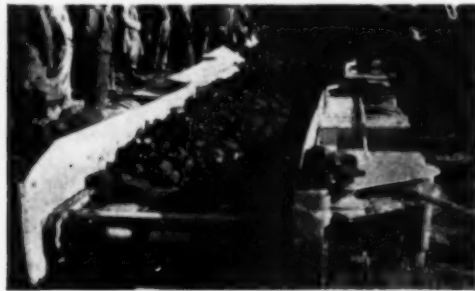


## New Equipment for Better Mining and Preparation

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Ball Bearings .....	p 118	Hitch-Hole Drill Bit .....	p 120	Plate Feeders .....	p 116	Truck-Body Heating .....	p 116
Belt-Repair Service .....	p 114	Hot-Water Heaters .....	p 120	Pumps .....	pp 118, 120	Welding Process .....	p 116
Buckets and Teeth .....	p 118	Locomotive Headlight .....	p 118	Shovel Control .....	p 114	EQUIPMENT SHORTS .....	p 120
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LOW-TYPE CONTINUOUS UNIT is shown tramming with the head closed at the left and mining with the head open at the right.



HARD-STRUCTURE UPPER KITTANNING COAL being produced during the demonstration at New Lexington, Ohio.

## Low-Type Continuous Unit Designed for 30- to 40-In Coal

**DESIGNED FOR OPERATION** in 30- to 40-in coal, the new Jeffrey 76-A low-type Colmol was demonstrated at the Sunnyside Coal Co. mine at New Lexington, Ohio, Nov. 1-2. This first unit has been purchased by the Ben Hur Coal Co. for its Blackstone mine, Henryette, Okla., where the thickness of the Henryette seam being mined averages 36 in.

With the head closed, over-all height of the new machine is 28 in. Length is 23 ft; width over the crawlers, 75

in; width at operator's station, 66 in; and width of the conveyor, 45 in. The unit weighs 23 tons.

Equipped with five chipping heads in the bottom row and 10 in the top, the low-type Colmol makes a cut 9½ ft wide. With an increased number of smaller chipping heads in the top row, it is expected that a smooth top will be obtained without further operations. Rate of advance in coal, according to the manufacturer, is 0 to 8 fpm. By cutting in a booster pump,

tramming speed is increased to 25 fpm.

All operations, including raising, lowering and tilting the head, operation of the chipping heads, raising and lowering of the rear conveyor, and independent operation of each crawler are accomplished by hydraulic motors, as in the original Colmol introduced in 1948 (December, 1948, *Coal Age*, p 84). Three 50-hp 220-v ac motors provide the power in the present unit.

COMMONWEALTH SAND & GRAVEL CORP.

gets 30% to 60% longer service  
with J&L CenterFit\* Wire Ropes

**J&L  
STEEL**



On this Northwest, Model 8, Dragline, performance records kept by Commonwealth showed that CenterFit lasted 60% longer than any conventional-type wire rope.

\*CENTERFIT, an exclusive J&L wire rope, is laid together in one operation. All strands run in the same direction. Outside strands fit snugly into valleys between inside strands and eliminate crowing as in conventional designs. This prevents internal nicking—gives longer wear. Eight outside strands plus CenterFit design give more steel, less void space, greater flexibility, easier handling.

... in addition, CenterFit\* Wire Ropes  
*cost less than ropes replaced*

Commonwealth Sand and Gravel Corporation, of Richmond, Va., produces 75,000 to 80,000 tons of sand and gravel a month. In such an operation wire rope draglines are of vital importance—important enough to maintain detailed service records that show the life obtained from each wire rope.

Let's look at Commonwealth's records with J&L CenterFit:

On a Northwest, Model 8, dragline with a 2 cu. yd. bucket, conventional wire rope draglines had an average life of from 90 hours to 100 hours. The first J&L CenterFit preformed Permaset

wire rope dragline used on this machine lasted 160 hours. The second, still in service, has equalled this record.

On a Marion 362 dragline with a 1½ cu. yd. bucket, J&L CenterFit wire rope draglines lasted, on the average, more than 30% longer than higher priced conventional wire rope.

It's records like these that prove again and again the extra value and savings operators get from CenterFit preformed Permaset—an exclusive J&L wire rope construction. J&L CenterFit has greater strength and flexibility than most wire ropes. Under constant usage J&L CenterFit usually outlasts other

types of wire rope and is, therefore, more economical to operate.

The new J&L booklet "Center-Fit" tells you where to use this exclusive wire rope. It is written for the man on the job. Let us send you a copy.

## JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY and JALLOY (hi-tensile steels).

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Jones & Laughlin Steel Corporation  
411 Jones & Laughlin Building  
Pittsburgh 19, Pa.

Please send me a copy of your new wire rope booklet describing "Center-Fit" wire rope.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

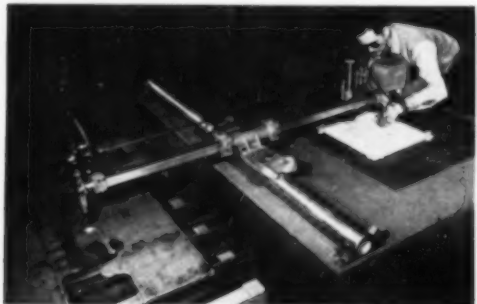
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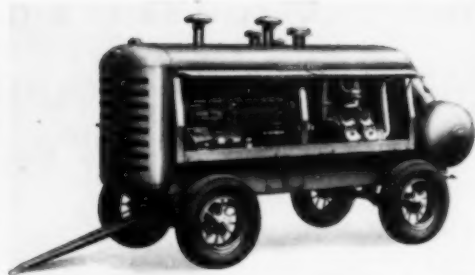
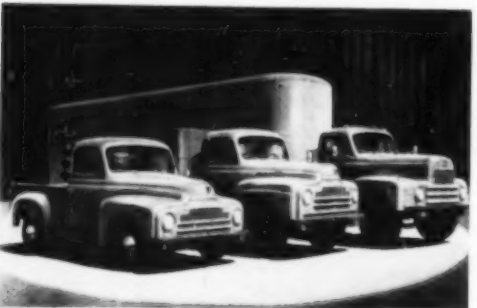
## EQUIPMENT NEWS



**CONVEYOR-BELT REPAIR SERVICE** offering complete repair of rips, spot vulcanizing, replacement of worn edges, splicing and sectional repairs, recently established at Mt. Hope, W. Va., includes careful advance examination of belts and estimate of work required and cost involved, it is said. For major repairs, belts are brought by pick-up-service trucks to company's plant, while for smaller jobs, vulcanizing equipment is taken right to the mine. Repair procedure reportedly includes careful measurement of belt moisture content and complete drying in an especially designed "conveyor-belt oven" before final repairs are made.—*West Virginia Belt & Cable Co., P. O. Box 361, Mt. Hope, W. Va.*



**OXYACETYLENE SHAPE-CUTTING MACHINE**—New portable Airco No. 3 Monograph, priced at \$695, reportedly is the lowest-priced machine of its type available and will cut steel up to 8 in. thick, in any shape within a 54-32-in. area, at speeds from 3 to 30 in. per min. Cutting-area length can be extended with tubular-rail extension and the unit also will handle straight-line, circle and bevel-cutting jobs with a high degree of accuracy, it is said. In its carrying case, the Monograph weighs only 110 lb and the tubular rail 35 lb. Bulletin ADC-660.—*Air Reduction Sales Co., 60 E. 42 St., New York 17.*

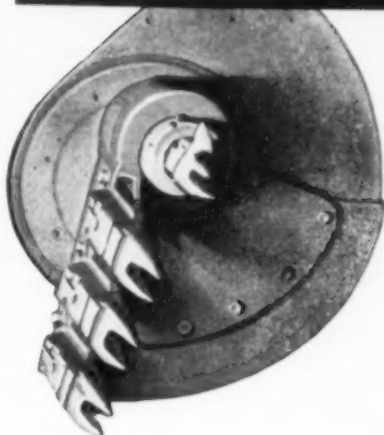


**PORTABLE AIR COMPRESSOR**—New IKA-500 Mobil-Air portable compressor is powered by an International Harvester heavy-duty UD-24 diesel which starts easily as a low-compression gasoline engine and after a short warmup is shifted to full diesel operation by a single lever. Features cited by the manufacturer include the new Floating-Speed regulator that slows compressor speed while providing sufficient air to hold pressure; two-stage air-cooled compressor; Hydro-Shift Flex-Disc clutch; and channel valves. The unit, which maintains 500 cfm at rated 100-psi pressure, also is available with a Type H oil engine and a Waukesha gasoline engine.—*Ingersoll-Rand Co., 11 Broadway, New York 4.*



**IMPROVED SHOVEL CONTROL**—"Magnetorque" swing has been added to another unit in the P. & H. line, the Model 955-A which has a capacity of 2½ yd as a shovel and 3 yd as a dragline. Previously available on a larger unit, the electro-magnetic-type swing mechanism is said by the manufacturer to feature elimination of all friction in swing and propel motions; smoother, more responsive swinging; more accurate and faster stops; and increased output as a result of elimination of waste motions and lowered maintenance. Bulletin X-122.—*Harnischfeger Corp., 440 W. National Ave., Milwaukee 14, Wis.*

**TRUCK LINE**—New completely redesigned and re-engineered L-Line of heavy-duty International Harvester trucks consists of 87 truck-chassis models designed to handle every conceivable hauling job, the company reports. The eight major classifications include units ranging from 4,200 to 90,000 lb. gv. Among the features of the new line cited by the manufacturer are: complete restyling for modern truck streamlining and extreme practicability; new "Comfo-Vision" cab custom-designed for more roominess, added comfort and visibility; new chassis engineering for better load distribution, greater maneuverability, shorter over-all lengths and improved engine accessibility; new improved valve-in-head engines, including an all-new Silver Diamond engine; and a variety of new mechanical and engineering improvement designed for important cost reductions.—*Motor Truck Division, International Harvester Co., 189 N. Michigan Ave., Chicago 1.*



One of the larger breaker heads is shown above. Note its sturdy construction. Performing on the business end of the unit, these large breaker heads dig and cut the coal as the machine moves forward. An installation view is shown below.

## LIKE A GIANT 'MOLE'

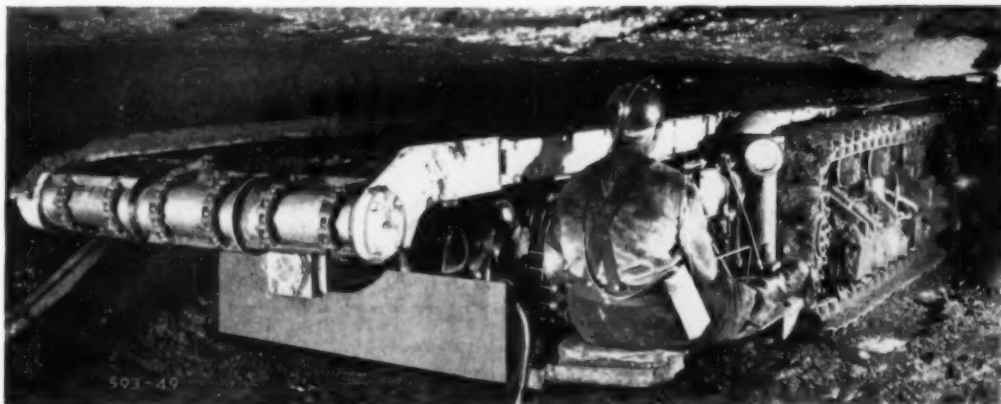
JEFFREY COLMOL

BORES THROUGH THE SOLID  
TO PRODUCE LARGE TONNAGES

• • •

### BIG BREAKER HEADS DO THE TRICK

Yes Sir! This interesting new one-process device really goes in after that coal...takes it out with a speed that spells 'Mass Production.' No question about it...once you have seen the COLMOL in action—and it's action all the way—you will be amazed at its ability to produce 3 to 5 tons per minute. It cuts and loads simultaneously—takes the place of conventional cutting, drilling and loading machines—no shooting required. We will be glad to tell you more—write us.



The **COLMOL** is engineered, manufactured, sold and serviced by

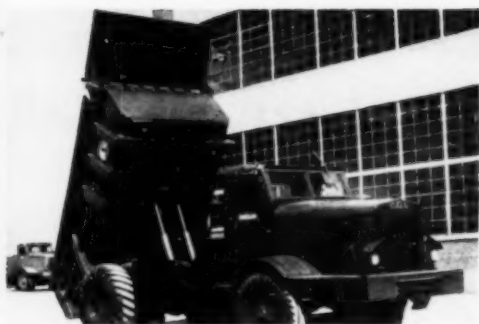
**THE JEFFREY MANUFACTURING COMPANY**

912 NORTH FOURTH STREET, COLUMBUS 16, OHIO

## EQUIPMENT NEWS

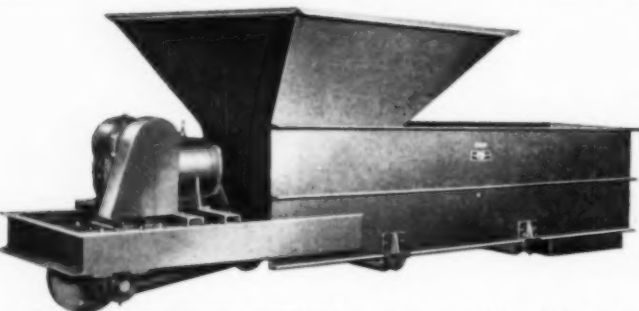


**WELDING PROCESS**—"Aircomatic" inert gas-shielded metallic arc-welding process developed a year ago for welding aluminum reportedly has been successfully applied to welding chrome-nickel or stainless steels and aluminum-bronzes. The process, which involves continuous feeding of a coiled-wire electrode in a gaseous shield through the barrel of a welding gun, permits high-speed continuous deposition of filler metal in all positions with a completely visible arc. Among advantages cited by the manufacturer in welding stainless steels are virtually no loss of alloying elements, equal or superior weld properties and greater deposit of stainless steel at given welding currents for reduced heat effects. Both manual and automatic equipment are available. Bulletin ADC-661.—Air Reduction Sales Co., 60 E. 42 St., New York 17.



**TRUCK-BODY HEATING SYSTEM** that prevents freezing of the load to the truck body in the winter now is available on Euclid trucks when requested. Heat for the system is fed into the truck body through a connecting pipe that fits, when the body is in normal position, to a coupler from the engine exhaust located at the rear of the cab. Channel or angle iron in place of the usual wooden sandwich between the bottom and sides of the truck and the wear surface provide space for circulation of the heat. Vents built into either the sides or back of the body permit spent fumes to escape and no muffler is required on the engine when the system is in use. Euclid is reported to have obtained exclusive use of the system on trucks of 7-tons capacity and larger.—Euclid Road Machinery Co., Cleveland 17, Ohio.

**EXPANDED TRUCK LINE**—New and expanded line of Dodge "Job-Rated" trucks comprising 356 models, compared with 248 models previously offered, ranges from 4,250 to 23,000 lb gvw and up to 40,000 lb gross combination weight to meet more than 97% of all hauling needs, according to the company. Including a wide range of model types and sizes, the new B-2 series continues important engine designs and offers, it is said, many new features such as; an electrical system which helps improve engine performance; new 5-speed synchro-shift transmission; new 5-speed synchro-shift overdrive transmission; and cyclebonded brake linings as standard equipment. Cross steering, standard on all models, together with the wide front axle, give Dodge trucks a 37-deg turning angle, it is said.—Dodge Division, Chrysler Corp., Detroit 31.



**RECIPROCATING PLATE FEEDERS** newly announced in widths up to 4 ft are designed for controlled regular feeding of coal at rates up to more than 50 tph and may be obtained with or without the upper welded steel hopper. The units, which utilize the reciprocating plate as the hopper bottom, feature three methods of controlling feed: changing eccentric throw; altering operation speed; or regulating the sliding door in the forward wall of the hopper. An "Economy Line" of reciprocating plate feeders also announced has a pan 6-ft long and 6 in high, in 20- and 36-in widths, for coal capacities of 15 to 60 tph. Driving mechanism may be easily adjusted for three different feeding strokes and rates of discharge, it is said. Bulletins 902, 907 and 929 available.—Bonded Scale & Machine Co., Columbus 7, Ohio.



**TRIP FEEDER-RETARDER**—Nolan "Cushion-Action" feeder-retarder is said to provide easy accurate mine-car control and to be designed so that in either action the respective dogs act gradually to both engage and disengage the pusher pads and provide a gentle positive action that eliminates the usual wracking, jolting or straining detrimental to mine cars. Feeder dogs shown above as they come into position to engage the pads are mounted alongside the retarder dogs, which are shown dropping away.—The Nolan Co., Bowerston, Ohio.

## Fast, Easy Shifting Under All Conditions with the New Eaton *Electric* Shift



The new Eaton electrically powered, push-button controlled shift for Eaton 2-Speed Truck Axles provides easy, positive shifting at any speed, on any grade. Shifting is easier and smoother because the actuating force is uniform at all times—unaffected by altitudes. The simplicity of the Eaton operating mechanism makes for minimum maintenance cost.

This exclusive Eaton Electric Shift provides for easier driving and greater safety—and improved axle and vehicle performance. See your truck dealer for the full story of Eaton electrically controlled 2-Speed Axles.

*More Than a Million  
Eaton 2-Speed Axles  
in Trucks Today*

# EATON *2-Speed Truck* AXLES



*Axle Division*  
**EATON MANUFACTURING COMPANY**  
CLEVELAND, OHIO



PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

WE EXTEND OUR SINCEREST WISHES FOR  
JOY, CHEER AND

*Christmas Happiness*

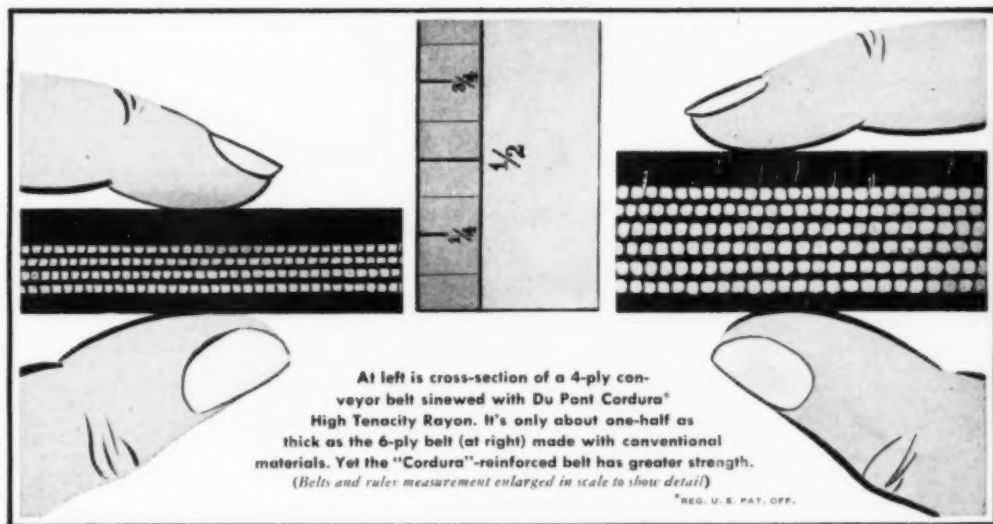


THE VALLEY CAMP COAL COMPANY

WESTERN RESERVE BUILDING - CLEVELAND 13, OHIO



# Why Du Pont "Cordura" Rayon measures up to today's conveyor belt needs



High-tenacity rayon—the material that made possible thinner yet tougher truck tires—is now doing a new job for the mining industry. It packs strength into conveyor belts . . . meets the need for belts that can do a bigger hauling job.

Du Pont "Cordura" High Tenacity Rayon makes a thinner belt—yet a stronger belt. That means maximum load-carrying ability and longer life.

## LOOK TO "CORDURA" RAYON FOR THESE CONVEYOR BELT ADVANTAGES

- ★ Greater tensile strength
- ★ Longer life
- ★ Heavier loads
- ★ Improved troughability
- ★ Longer lifts with fewer transfer points
- ★ Lighter belts that are easier to set up
- ★ Resistance to flexing
- ★ Resistance to loading impacts
- ★ Reduced operating power expense

And "Cordura" meets the need for long-lift belts that eliminate costly transfers. Its high tensile strength and low bulk provide outstanding troughability in such applications.

Next time you need a conveyor belt, ask your supplier for a belt that's sinewed with super-strong Du Pont "Cordura" Rayon. And write today for detailed information about the use of "Cordura" in conveyor belts. Address Room 4527, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

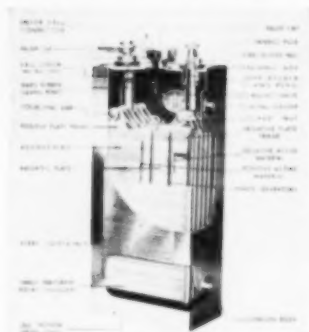
## DU PONT "CORDURA" HIGH TENACITY RAYON



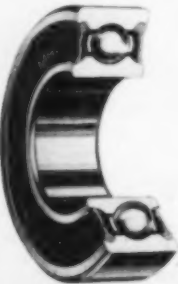
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

for RAYON . . . for NYLON . . . for FIBERS to come . . . look to DU PONT

## EQUIPMENT NEWS



**STORAGE BATTERY**—Nife alkaline nickel-cadmium storage battery originally developed in Sweden and used abroad for many years now is available in the United States. Among the features cited by the manufacturer as contributing to high efficiency and low cost are: long life; steel construction throughout; greater resistance to shocks and vibration; no sulphating or similar disintegrating processes; no damage from low temperatures; no standing losses, making equalizing charges unnecessary; low internal resistance; capacity almost unaffected by high discharge; no generation of corrosive gases or gassing during discharge; chargeable by extremely low currents; immune to occasional excessive discharges and short circuits; and not sensitive to overcharging.—*Nife, Inc., 165 Broadway, New York 6.*



**BALL BEARINGS**—New "Synthe-Seal" standard-dimension ball bearings feature single or double removable synthetic-rubber seals incorporating a steel core for strength that seals out dirt and moisture. According to the manufacturer, the seal effectively retains lubricant for long periods and can be removed or replaced quickly as a unit without special tools. The pliable synthetic rubber wiping lips contact the ground curved surfaces of the inner race, thus assuring a tight closure, it is said. Synthe-Seal bearings are available in standard SAE single-row bores, O.D.'s and widths in a variety of sizes. Bulletin 1582-2. *Marlin Rockwell Corp., Jamestown, N. Y.*

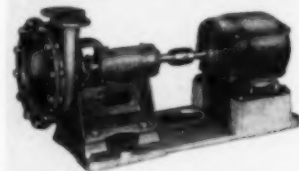
**EXCAVATING BUCKETS AND TEETH** of new design and materials are featured by the recently formed Baer Steel Products, Inc., of which Joe Baer, previously chief design engineer of the Electric Steel Foundries Co., is co-owner-manager. "Fibralay," a new steel recently developed by the Pacific Car & Foundry Co., is used for castings on premium-grade dragline, dipper and hoe buckets and for the new line of replaceable teeth available for all makes of buckets, it is said. The normally vulnerable dragline-bucket hitch-plate assembly reportedly has been strengthened by use of Fibralay and a new tongue and socket design that stiffens the whole front. Bucket rope sockets have a true-circle design that maintains the rope at its full diameter and prolongs its life, the company says. Baer hoe buckets are manufactured in different widths for the same yardage in solid material or loose gravel.—*Baer Steel Products, Inc., Auburn, Wash.*



**PLASTIC CABLE-SPLICE HOUSING**, said to drastically reduce time needed to splice power and signal cables by eliminating lengthy outside wrapping operations, is recommended by the manufacturer to provide a durable water-tight seal for both aerial and underground installations with either rubber or Neoprene cable. The main part of the housing is a pipe made from a tough corrosion-proof blend of synthetic rubber and thermoplastic resins sealed under pressure by rubber seals at each end. The housing has an extremely low moisture absorption, is unaffected by sunlight and by temperatures from 180 to minus 4 F and is resistant to acids, oils and alkalis, according to the manufacturer. Two sizes are available: 1½-in inner diameter for cables up to 1 in thick, and 2-in diameter for cables up to 1½ in, with a special design for a Y-splice connection.—*U. S. Rubber Co., Rockefeller Plaza, New York 20.*

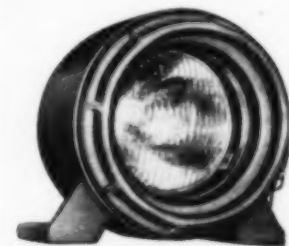
**DC ELECTRIC MOTORS**—New Type SK Westinghouse Life-Line dc motors reportedly retain the basic design of earlier SK motors but feature the same all-steel construction used in Life-Line ac motors, along with heavy end brackets and prelubricated sealed-for-life ball bearings that require no further lubrication. The motors are available in 1- to 30-hp ratings, in Frames 203 to 365, for constant, adjustable or varying speed applications and for either continuous or intermittent service. They can be supplied

with shunt, compound or series windings, for operation from 115, 230, 550 or 660 v.—*Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.*

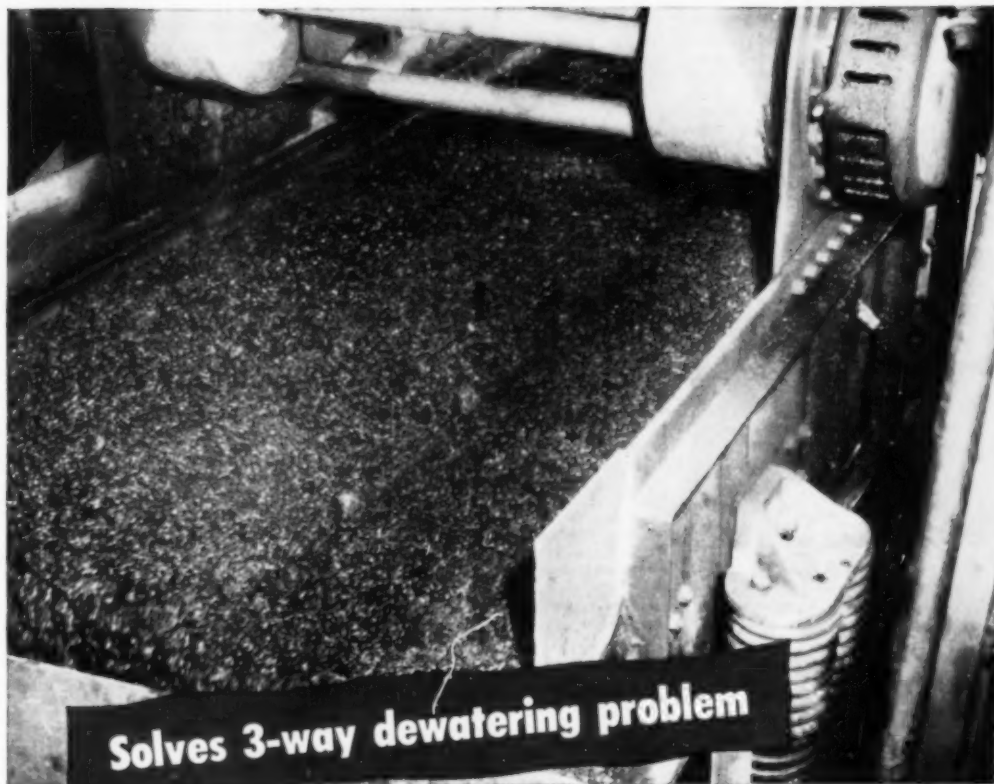


**CENTRIFUGAL PUMPS**—New Gould line of stainless-steel industrial pumps reportedly are engineered to offer dependable efficient service in handling corrosive liquids. The units' simplified sturdy design not only permits low operating and maintenance costs but also low initial cost, the company says. The pumps are available in eight sizes, with capacities up to 750 gpm and heads up to 180 ft. Bulletin 725.3 available.—*Goulds Pumps, Inc., Seneca, N. Y.*

**METAL DETECTOR**—New electronic metal detector for both ferrous and non-ferrous tramp metal is said to be particularly adaptable for installations on conveyor belts operating at speeds up to 900 fpm ahead of screening, pulverizing and crushing equipment where magnetic separation is not applicable. The detector, or search coil, custom-built to surround the conveying belt with an electric-magnetic field, automatically stops the belt if foreign metal enters the area, marking the spot where the metal can be found. After it is recovered, the conveyor is easily started by pushing a control button. The unit is adjustable to detect the particular size of metal causing damage.—*Eriez Mfg. Co., 1266 E. 12th St., Erie, Pa.*



**LOCOMOTIVE HEADLIGHT**—New Bemco "Locolite" sealed-beam locomotive headlight, producing 19,000-beam candlepower and an intense light beam for over 500 ft, features a resilient spring-type mounting that firmly supports the lamp and protects the filament from damaging vibration and even severe shocks, according to the manufacturer. All parts are said



## Solves 3-way dewatering problem

**Leading coal company reduces ash content, increases salable tonnage, reduces road hazards**

The Philadelphia & Reading Coal & Iron Co. solved three troublesome problems with two Robins Eliptex Dewaterizers.

**First**—to remove  $\frac{3}{4}$ " pyrites and other ash-forming substances from No. 5 anthracite. Feeding this coal very wet (400 gals. of water per minute to 40 tons of coal per hour) to one Eliptex Dewaterizer, they simultaneously produce low-ash coal and effectively dewater that coal.

**Second**—to reclaim fines from washed No. 4 anthracite. Another Robins Eliptex Dewaterizer not only removes a high percentage of the surface moisture but salvages some 125 tons per hour of salable fines.

**Third**—to eliminate winter highway hazards. The Robins Eliptex Dewaterizers do such a thorough dewatering job that there are no trails of ice-forming drippings from trucks loaded at the Philadelphia & Reading breaker.

Many breaker and tippie operators report the Eliptex Dewaterizer far more effective than devices costing ten times as much. What is more, this low initial cost is matched by low operating cost, low maintenance cost.

You will actually profit by installing the Robins Eliptex Dewaterizer. May we place the facts before you?

# ROBINS

## ELIPTEX DEWATERIZER

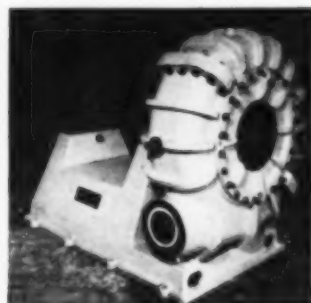
**SEND TODAY** for your copy of new Robins Bulletin 129. Fully illustrated, it describes the outstanding features, advantages and benefits of the money-saving Robins Dewaterizer. Address the Robins Conveyors Division, 270 Passaic Avenue, Passaic, New Jersey.

ROBINS CONVEYORS DIVISION **HEWITT-ROBINS INCORPORATED**

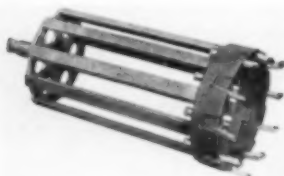


## EQUIPMENT NEWS

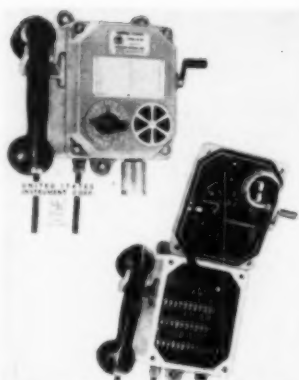
to be readily accessible, with a screw driver for making electrical connections the only tool required to replace the sealed-beam lamp. Locolite is made in the permissible Type P, with a  $\frac{1}{2}$ -in.-thick Pyrex heat-resistant glass lens and non-permissible Type NP with a  $\frac{1}{4}$ -in. lens.—*National Mine Service Co., Beckley and Logan, W. Va.; Forty Fort, Altoona and Indiana, Pa.; and Jenkins and Madisonville, Ky.*



**SOLIDS-HANDLING PUMPS**, said to offer high efficiency and unusually long service life in handling abrasive liquids, feature a design that permits use of Thomas Ni-Hard, a comparatively non-ductile but extremely abrasion-resistant material. A floating suction seal, utilizing a small quantity of clear water, is said by the manufacturer to prevent the flow of abrasive liquids between the impeller and side liners and thus maintain close running clearances and high efficiencies over long periods. The Thomas dredge pumps are manufactured in a full range of sizes up to a 16-in. pipeline, with or without the sealing device.—*Thomas Foundries, Inc., Birmingham 1, Ala.*



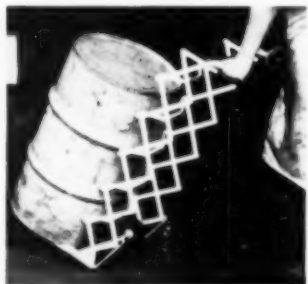
**KITCH-HOLE DRILL BIT** drilling  $\frac{3}{4}$ -in.-diameter holes with a  $7\frac{1}{4}$ -in. core utilizes 10 finger bits with Kennametal cemented-carbide tips set in the cutting face. It reportedly can be used on any mounted drill of 5-hp capacity or more and, according to the manufacturer, offers a drilling rate of 2 to 3 fpm in average coal. Normally the bit is used to drill a hole 3 ft deep in one rib and a  $1\frac{1}{2}$ -ft deep in the other. Timber is inserted in the 3-ft hole, then moved into the shorter hole and wedged without the need of upright supports. Bulletin M-104 available.—*Kennametal, Inc., Latrobe, Pa.*



**MINE TELEPHONES**—New line of sound-powered telephones, said to operate up to 30 mi without batteries or any outside power for either talking or ringing circuits, reportedly have been completely redesigned and offer new features. Common-talking selective-ringing systems up to 24 stations, or an unlimited number of common-talking common-ringing stations, can be used per system. Permissible types are available and all units are weatherproof and dustproof. Catalog 400-A available.—*U. S. Instrument Co., Summit, N. J.*

**LARGE-QUANTITY HOT-WATER HEATERS**—Hi-Flow hot water heaters available in nine sizes with capacities from 3,960 to 31,500 gph for installation where large quantities of steam and water are available are said to operate instantly and noiselessly. The unit features small dimensions, safe operation, manual or automatic regulation and low maintenance and replacement cost, according to the manufacturer. Larger-capacity units may be built to order. Bulletin available.—*A. Gunthard Co., Ennis, Tex.*

### Equipment Shorts

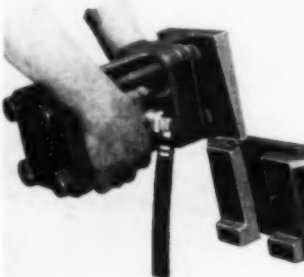


**HAND TRUCK** — "Fold-A-Way" hand truck with capacity of 700 lb can be folded to height of 9 in for

storage in shops or trucks. Truck features all-steel construction, recessed wheels, oil-less bearings and glider bar for assistance on steps.—*Business Equipment Specialists, 19 West 44th St., New York 18.*

**DRAGLINE-BUCKET CHAIN**—New line of Tisco cast-manganese-steel dragline-bucket pulling and hoist chain designed for heavy-duty service features the S & A full-bearing design which reportedly permits each link to contact each adjacent link throughout the thickness of the link and results in longer life and fewer stoppages to repair chain. All links are poured at one time from one heat of Tisco manganese steel to insure a chain of uniform analysis and heat treatment. The chain is available in standard sizes of 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ ,  $1\frac{3}{4}$ , 2 and 3 in.—*Taylor-Wharton Iron & Steel Co., High Bridge, N. J.*

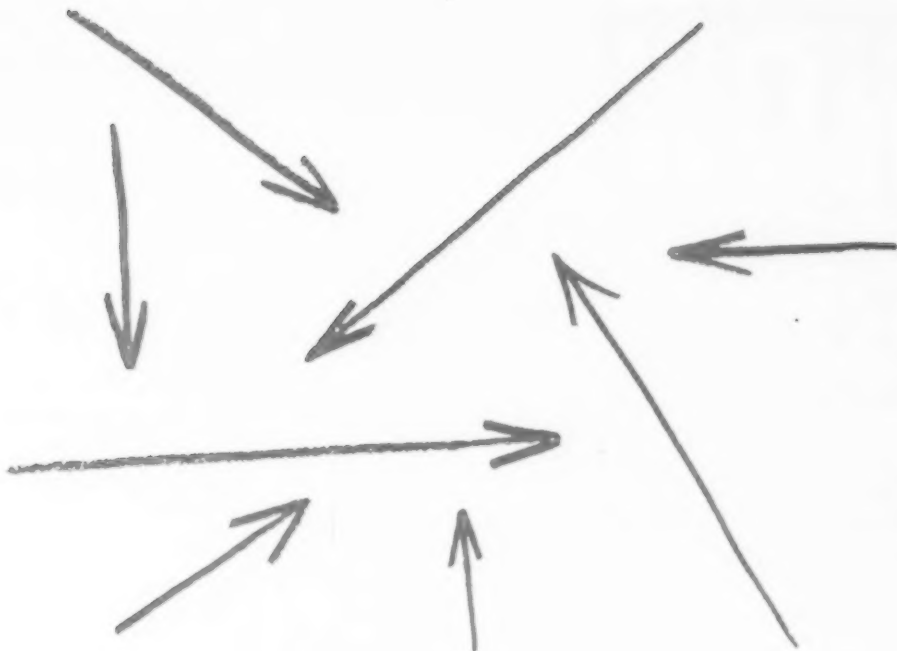
**WATER HOSE**—Colored orange to make it easily visible in the dark, new "Alarm"  $\frac{3}{4}$ -in. hose is offered primarily for wetting dangerous mine dusts.—*B. F. Goodrich Co., Akron, Ohio.*



**PORTABLE VIBRATOR**—A pneumatic vibrator that speeds unloading of bulk materials from bins and hoppers features portability for application at various points on the hopper. Female mounting brackets, permanently attached to bin or hopper, hold the vibrator during operation. Standard and heavy-duty models are offered.—*Cleveland Vibrator Co., 2718 Clinton Ave., Cleveland 13, Ohio.*

**BIT-GRINDING JIG**—Jig designed for mounting under any standard double-end grinding machine mechanically sets and controls grinding angles in reconditioning cemented carbide-tipped mining machine bits, and also automatically prevents undergrinding or overgrinding. Bits reconditioned in the jig give longer service as a result of accurate grinding and uniform finish, the company says.—*Kennametal, Inc., Latrobe, Pa.*

**WOOD PRESERVATIVE** — New "Tuf On" "Non-Tox" for sealing and preserving wood products is said by the manufacturer to be effective against mold, decay, mildew and moisture and to help prevent warpage and



## They're all the same to a TIMKEN® bearing

**N**O MATTER from what direction the loads may come, Timken® roller bearings carry them all safely—dependably. Timken bearings are tapered in design—carry both radial loads, thrust loads and any combination of them.

With Timken bearings in your product, auxiliary thrust bearings and thrust plates are eliminated. Designs can be simplified, space saved, cost reduced.

You have a better-working product, too. The tapered construction of Timken bearings prevents end-play and holds shafts in proper alignment. Wear on surrounding parts is reduced; gears mesh more smoothly.

And Timken tapered roller bearings give you these added advantages: Due to the line contact between rolls and races, they have extra load carrying capacity.

True rolling motion and smooth surface finish practically eliminate friction. Timken bearings permit the use of closures which keep lubricant in—dirt out. And since they're made of Timken fine alloy steel, Timken roller bearings normally last the life of the machine in which they are used.

Dependable performance and public acceptance of Timken bearings have made Timken-bearing-equipped products first choice throughout industry. They add a valuable sales feature in your product—build greater acceptance among customers. When you specify bearings for your product, specify "Timken". And when buying new equipment, always look for the trade-mark "Timken" on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

*50th birthday of the company  
whose products you know  
by the trade-mark: TIMKEN*



**TIMKEN**  
TRADE-MARK REG. U. S. PAT. OFF.  
**TAPERED ROLLER BEARINGS**



# NOW

**A SAFER,  
BETTER  
MINE CAR  
COUPLER**



**SAFETY • SPEED  
CONVENIENCE**

## To Cut Your Haulage Costs

You can save time, cut maintenance—prevent accidents—with American Automatic Mine Car Couplers. They lock surely and securely on straight track or turns—can't "creep" or jar open—unlock easily from either side. Any two heads will intercouple, and cars can be rotary-dumped without uncoupling.

### MANY EXCLUSIVE FEATURES

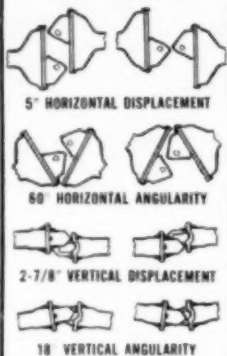
Exclusive nose-and-pocket heads have amazing gathering range, yet couplers are self-centering, self-leveling . . . won't "jack-knife" under compression. Pull is transmitted entirely through rugged cast-steel contacts. Buffing pressure and pushing forces are taken by husky flanges—not by the locking parts.

### FOR ALL CAR SIZES—ALL LOADS

Heads are *always* ready to couple . . . won't lock, and can't be lock-set unless two heads are tight together. Long-time railroad coupler specialists designed this better coupler for safer, faster mine car use at big savings in over-all costs. Here's something you should know about for now, and for the future.

● Made in swiveling and non-swiveling types, and with attachments—as required—for locomotives.

### COUPLES AUTOMATICALLY IN ALL POSITIONS



### Ask for Free New Booklet!

Get all the facts about these modern American Couplers. They lock with a tight grip to prevent slack and costly wear. Locking parts are protected within smooth contours that won't pinch or snag. Built by pioneers in the development and manufacture of automatic couplers for railway, industrial, and mine cars—world's largest producer of cast steel. Write American Steel Foundries, 410 N. Michigan Ave., Chicago 11, Ill.

**Safe...Sure AMERICAN  
MINE CAR COUPLERS**

shrinkage. It is non-toxic to humans and can be applied by various methods.—*Brooklyn Varnish Mfg. Co., 50 Jay St., Brooklyn 1, N. Y.*

**PUMP SEALS**—Three new mechanical seals for sealing stuffing boxes of centrifugal pumps reportedly replace conventional packing for increased service and reduced maintenance. The units, which require no adjustment during or after installation and can be installed and maintained by plant personnel, include Type U high-pressure single seal, Type L low-pressure single seal and Type B oil-lubricated double seal.—*Byron Jackson Co., Pump Division, Terminal Annex Box 2017, Los Angeles 54.*

## Industrial Notes

The Morrow Mfg. Co., Wellston, Ohio, has announced a change in its name to The McNally Pittsburg Mfg. Corp., effective Dec. 1. There will be no change in management personnel or operating policies.

Allis-Chalmers Mfg. Co., Milwaukee, has announced a program providing up to 20 annual scholarships of \$500 each for children of employees. A minimum of five scholarships will be awarded to applicants desiring to enter college between June 1, 1950, and May 31, 1951. While these grants will be for one year only, they may be renewed if the students satisfy standards of the scholarship committee. Five additional scholarships will be awarded annually until a maximum of 20 are in force. The company also has announced that Max L. Murdock, acting manager of the centrifugal pump department at its Norwood (Ohio) works, has been promoted to manager of the department, succeeding H. C. Gatton, retired. Woodrow Brixius, formerly application engineer in the company's West Allis works centrifugal pump department, has been named assistant to Mr. Murdock, and Paul B. Hugenberg has been appointed application engineer in charge of sales and orders.

L. R. Kerns Co., Chicago, has announced that L. R. Kerns is no longer associated with the company, his interest having been purchased by a group of the employees. The new officers will be: B. L. Smalley, president; S. F. Gordon, vice president; D. R. Fredericks, vice president; and M. H. Schellenberg, secretary-treasurer. There will be no change in personnel or company policies and the name, L. R. Kerns Co., will be retained.

Carboloy Co., Inc., Detroit, has announced expansion of its service and marketing facilities for the coal industry with the appointment of eight new distributors, as follows: Bluefield Supply Co., Bluefield, W. Va.; Erwin

# Announcing...



## The New Kennametal Bit for Pin Hole Drilling



Kennametal FD Bits have a hard, durable cutting edge of solid Kennametal cemented carbide... tough body construction for lasting service.

### KENNAMETAL

Trade Mark Reg. U. S. Pat. Off.

DRILL BITS • MACHINE BITS • STRIP BITS • ROCK BITS

The new pin hole drilling bit developed by Kennametal gives you 10% to 20% faster drilling speed than pneumatic methods. It drills hard shale, hard slate, and laminated sandstone. Holes are drilled in single gage, saving drilling time and giving your expansion units full contact area.

You get maximum speed in drilling medium roof... make big savings on equipment cost and handling time.

Let the Kennametal representative near you tell you the complete story on the new Kennametal pin hole drilling bit! He can recommend, demonstrate, and give your problems the benefit of his specialized experience.

Mining Division, Kennametal Inc., Latrobe, Pa.

KENNAMETAL INC.,  
Latrobe, Pa.

Send me a free copy of Bulletin M-105, describing your new pin hole drilling bit.

Name \_\_\_\_\_

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Company \_\_\_\_\_

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CLIP THIS  
COUPON  
— mail for  
particulars  
today!



## A MERRY CHRISTMAS from OLD SAINT "VIC"!

**On his 25th Christmas "Vic" brings you Hearty Greetings!**

And don't let his whiskers fool you! His Victaulic Joints are flexible and quick. His Full-Flow Elbows swivel as easily as ever. His iron veins are tight and lasting. He is more ready than ever to serve you from his work-shop with dependable piping necessities - Victaulic Pipe Couplings... Victaulic Full-Flow Elbows, Tees and other Fittings... and Vic-Groover Pipe Tools—all engineered for modern, simplified piping.

**Merry Xmas and a Prosperous New Year!**

Sizes — 3/4" through 60"

**VICTAULIC COMPANY OF AMERICA**  
30 Rockefeller Plaza, New York 20, N. Y.  
Victaulic Inc., 727 W. 7th St., Los Angeles 14, Calif.  
Victaulic Company of Canada, Ltd., 200 Bay St., Toronto 1  
For Export outside U.S. and Canada: PIPECO Couplings and Fittings; Pipe Couplings, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

SELF ALIGNING PIPE COUPLINGS  
**VICTAULIC**  
EFFICIENT FULL FLOW FITTINGS

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Hardware & Supply Co., Inc., McClure, W. Va.; Fairmont Supply Co., Fairmont, W. Va.; Harris Pump & Supply Co., Pittsburgh 3, Pa.; Kentucky Mine Supply Co., Inc., Harlan, Ky.; Marathon Coal Bit Co., Montgomery, W. Va.; Mine & Smelter Supply Co., Denver, Colo., and Salt Lake City, Utah; and Whiteman Division, National Mine Service Co., Indiana, Pa. All will carry the recently announced improved Carboloy cemented-carbide heavy-duty bits in stock, as well as other Carboloy mining equipment.

**W. J. Corr** has been named director of service, Mack Trucks, Inc., a newly created post combining supervision of both the former service engineering and general service departments. With the company for 25 years, Mr. Corr will be in charge of all parts and service activities. Creation of a new territorial sales unit, to be known as the Southwestern Division and with headquarters at Dallas, has been announced by the company. The new division includes all of the states of Texas, New Mexico, Oklahoma, Louisiana, Arkansas with the exception of Mississippi and Crittenden Counties, the southern half of Mississippi and the Republic of Mexico. D. C. Wheeler, recently elected a vice president and in charge of the Dallas office since 1942, has been named to head the new division.

**Nelson L. Davis Co.**, Chicago, has named Otto von Perbandt to its staff as contracting engineer in charge of estimating. Mr. von Perbandt has been active for many years in the engineering field in connection with coal-preparation problems.

The Ohio Oil Co. has transferred M. E. Alexander as industrial salesman from Salem to Springfield, Ill., succeeding L. B. Baker. Mr. Alexander will serve the coal industry in the Springfield area.

**Robert A. Speck** and **George R. Milne** have been appointed vice presidents of the National Carbide Corp., New York. Mr. Speck will be in charge of sales and distribution and Mr. Milne will have charge of operations, with headquarters in Louisville, Ky. W. P. Metcalf has been appointed purchasing agent and R. J. Niebanck has become technical assistant to the president.

**John S. Bachman** has been appointed sales manager, Ransome Construction Equipment Sales Division, Worthington Pump & Machinery Corp., Dunellen, N. J., succeeding William F. Lockhardt, resigned. Mr. Bachman, who was formerly construction equipment regional supervisor, with headquarters in Washington, D. C., has been succeeded by Lloyd L. Brooks, industry specialist in the construction equipment division.

**Robert C. McColgin** has been appointed sales and service representative in the southern Illinois territory for the D-A Lubricant Co., Inc.,

**All Muscle  
...no fat**

3 1/2 -yard ESCO Cast-Welded Dipper on Lima 1201 with 32' 6" boom, and 22' dipper stick, excavating sand and gravel in California quarry.



## **Strength**

to lick tough jobs, but without useless weight to slow down your digging—that is the story of the *ESCO* Cast-Welded dipper bucket shown here. It means that full fighting strength remains after excess weight has been engineered out. Or, in terms of your digging jobs, it means

**Greater Capacity per Pound**

**More Passes a Day**

**More Payload per Pass**

A close inspection of these buckets points out the basic reasons for the performance of *ESCO* Cast-Welded dippers. It shows

**Manganese Steel for Wearing Parts**

**Cast Alloy Hollow Back Beams**

**Flaring Outside Teeth for Full Bite**

**Streamlined Dipper Front**

**Tapered Box for Easy Loading and Quick Discharge**

Let your nearest *ESCO* representative tell you about this all-muscle-no-fat dipper bucket. Or fill in and mail the coupon for illustrated literature. Electric Steel Foundry, 2179 N.W. 25th Avenue, Portland 10, Oregon. 728 Porter Street, Danville, Illinois. Offices in Pottsville, Pa.; Eugene, Oregon; Chicago; Honolulu; Houston; Los Angeles; New York City; San Francisco; Seattle and Spokane. In Canada, *ESCO* Limited, Vancouver, B.C.

# **ESCO**

## **Dragline, Dipper and Coal Loading Buckets**

ELECTRIC STEEL FOUNDRY

2179 N.W. 25th Avenue, Portland 10, Oregon

Please send catalog on your Cast-Welded Dipper Buckets to:

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Make and model of machines used \_\_\_\_\_

# CONTROL COAL DUST with Pangborn Dust Control



## PANGBORN Dust Control Equipment gives you:

- efficient coal dust disposal and reclamation
- increased safety
- improved working conditions
- lower equipment maintenance cost
- decreased dust nuisance

In scores of coal preparation plants, Pangborn Dust Control installations have paid off over and over again by improving working conditions, eliminating dust nuisances, cutting maintenance costs, doing a superior job of dust disposal and reclamation. By effectively collecting the fine coal dust produced in the operation of tipples, dry cleaning, de-dusting and other preparation facilities, Pangborn has become a by-word for making profit-stealing coal dust behave.

Whatever your dust problem—high machinery maintenance, nuisance, lost profits through faulty reclamation—Pangborn engineers can help you with an economical and effective solution. Let us make a *dust pocket survey* for you. No obligation—but with the information it gives us, we can recommend the right Pangborn Dust Control Equipment to rid your plant of dust hazards and nuisances.

Write for Bulletin 909A, "The Control of Industrial Dust." PANGBORN CORPORATION, 288 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for all the latest developments in Dust Control and Blast Cleaning Equipment.



THE DUST HOG

from stealing profits with

# Pangborn

DUST CONTROL

Indianapolis, with headquarters at Springfield, Ill. Prior to his assignment to the southern Illinois area, Mr. McColgin had extensive training in the D-A laboratory and served as a sales representative in another territory.

Koppers Co., Inc., Pittsburgh, Pa., has named Fred Dernig, vice president, manager of the company's production department, succeeding Hugh C. Minton, retired because of ill health. Dr. G. Frank D'Alelio has been named vice president and manager of the research department, to succeed Mr. Denig in the post which he has held since 1934. Dr. A. R. Powell, formerly assistant manager, has been made associate manager of the research department.

Acquisition of the controlling interest in the 82-year-old Ottumwa Iron Works, Ottumwa, Iowa, by Lou Mervis, industrialist and present head of the Pittsburgh Gear Co., Pittsburgh, Pa., was recently announced. Mr. Mervis has become president, and other new officers for the Ottumwa concern include: E. R. Phillips, vice president in charge of sales; Francis Knuth, vice president; Myra Mervis, treasurer; and John Thurlow, secretary.

J. F. Berger has been named manager of sales for industrial wire products, and Samuel K. Horner, manager of sales for hardware products, woven-wire fabrics division, John A. Roebeling's Sons Co., Roebeling, N. J. Mr. Berger has been associated with Roebeling for over 35 years, entirely in the woven-wire fabrics field. Mr. Horner has served Roebeling in various sales capacities for the past 12 years.

Detroit Diesel Engine Division, General Motors Corp., has appointed the Colorado Builders' Supply Co., Casper, Wyo., distributors for GM Series 71 industrial and oil-field diesel engines for the state of Wyoming, except Teton, Lincoln and Uinta counties. The company is equipped to handle all GM diesel service and parts work in its shop and has a new warehouse under construction. It also has been distributor for the Detroit Diesel Engine Division out of its headquarters in Denver, Colo., since 1947.

Roger Howley, formerly Pittsburgh representative, has been promoted to truck and bus tire representative for the Akron district of the General Tire & Rubber Co. Appointment of three sales representatives also has been announced, as follows: John Welsh, Pittsburgh, succeeding Mr. Howley; Robert Golden, Erie, Pa., replacing Robert Shute, resigned; and William Ford Jr., Cincinnati. Henry A. Haas, formerly assistant manager, has been appointed manager of Kraft service and accessory sales for the company, succeeding the late S. S. Berry.

Air Reduction Co., Inc., New York, has named H. R. Salisbury president



*Marion presents  
AN ALL-NEW  
6 CUBIC YARD  
COAL LOADER!*

*It's the*  
**III-M  
MARION**

**WITH  
WARD-LEONARD CONTROL!**



**IT'S FAST! IT'S POWERFUL! IT'S ECONOMICAL!**

Here's the new all-electric version of the MARION 111-M, a 6 cubic yard coal loader that's setting production records across the country. It's a blend of speed, power and

economy that gets big jobs done quickly. Delivery dates?—earlier than you might think. Why not check your nearest MARION District office or agent today?



## Reduce Costly Replacements and Repairs

### WITH KOPPERS Long-Life Poles

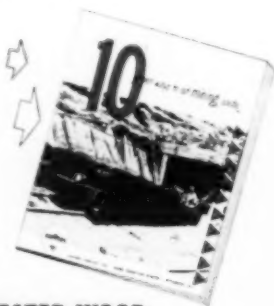


**T**HE trolley pole installation pictured above is a money-saver for mines. These Koppers Poles are made from strong Southern Yellow Pine, and are pressure-treated with creosote. This treatment protects poles against decay . . . greatly reduces the number of costly replacements. Koppers Pressure-Creosoted Poles provide rigid support for trolley and feed lines; also, they retain their strength, and therefore minimize repairs.

There are many other places where Koppers Pressure-Treated Wood can save money for mine operators. For example, by using pressure-treated wood, instead of ordinary wood, in

ties for main haulageways—in timber sets and props—costs can be cut by as much as 62% and 76%, respectively.

To find out the full story of these substantial savings, send for our free book, "10 Proven Ways to Cut Mining Costs."



**KOPPERS**

**PRESSURE-TREATED WOOD**

KOPPERS COMPANY, INC., Pittsburgh 14, Pa.

of Air Reduction Sales Co. Mr. Salisbury has been with the organization more than 23 years in various executive capacities. Appointed vice presidents were H. F. Henriques, general sales; J. J. Lincoln, Jr., railroad sales and sales services; S. B. Stouffer, distribution; and N. L. Wiesser, field office management.

G. L. Gabrielson has been appointed sales agent in the Pittsburgh office of the American Car & Foundry Co. Mr. Gabrielson was formerly in the miscellaneous products division of ACF's sales department in New York.

The Timken Roller Bearing Co. has announced the opening of new offices and warehouse facilities at 2100 S. Vandeventer, St. Louis 10, Mo.

Independent Pneumatic Tool Co., Aurora, Ill., has appointed Eugene C. O'Connell, formerly service engineer in the Los Angeles branch, manager of its San Francisco sales and service branch, and Clarence H. Gabriel, formerly service engineer in the company's Salt Lake branch, manager at Denver.

Warren Ingersoll has been named assistant to the president of the Lee Rubber & Tire Corp. Mr. Ingersoll until recently represented the company on the West Coast with headquarters in San Francisco and previously was Philadelphia district manager of Lee's Republic Rubber Division.

Gould Storage Battery Co., Trenton, N. J., has announced that to provide faster and more complete sales and delivery service and improved battery-repair facilities it has combined under one roof at 244 Fremont St., San Francisco, the sales, service, and warehouse facilities formerly carried on at three different locations. The new office will head up the Gould Western region, which now offers sales and repair services in San Francisco, Los Angeles, Portland, Seattle and Denver. C. H. Hart, formerly San Francisco district manager, now is in charge of the entire Western region.

Victor Equipment Co., San Francisco, has purchased Mills Alloys, Inc., Los Angeles, manufacturer of blasting nozzles and tungsten-carbide hard-surfacing rod. The company will continue its manufacturing operations as the Alloy Rod & Metal Division of Victor Equipment Co. Victor is planning to add modern rod rolling and mill equipment to the seven electric furnaces acquired by the purchase, with a view to producing a complete line of hard-surfacing welding rods.

Gerald F. Twist has been appointed manager, Peerless Pump Division, Food Machinery & Chemical Corp., with headquarters at Los Angeles, succeeding Francis F. Fairman Jr., who has resumed his former association with the General Electric Co. Previously, Mr. Twist was a vice president and manager of FMC's new-

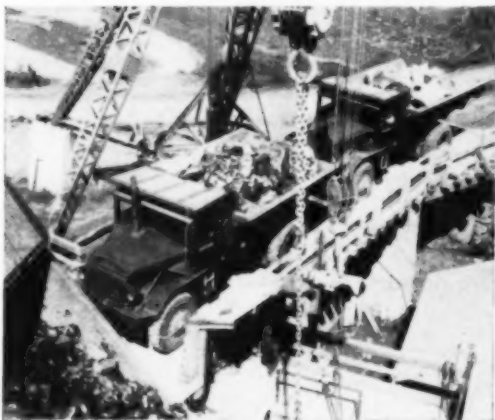


*"So smooth I wouldn't  
know it was there..."*

*... that's what Edgar Bishop says  
about the Fuller Transmission in his  
new Euclid Rockhauler.*



*Five Euclid Rockhaulers handle 300 tons an hour over  
the steep haul road from pit to crusher.*



*Two of the General Crushed Stone Company's haulers  
waiting to unload at the crusher.*

The five Euclid Rockhaulers at The General Crushed Stone Company, Glen Mills, Pa., are equipped with Fuller 5A920 Transmissions. Hauling heavy loads up steep grades, drivers like Edgar Bishop appreciate the extra smoothness in quiet-running, easy-shifting Fuller Transmissions.

Whatever the operating conditions—heavy loads on steep grades . . . empty runs on level roads—Fuller Transmissions and Auxiliaries have the wide range of gear ratios that lets your trucks take them in stride.

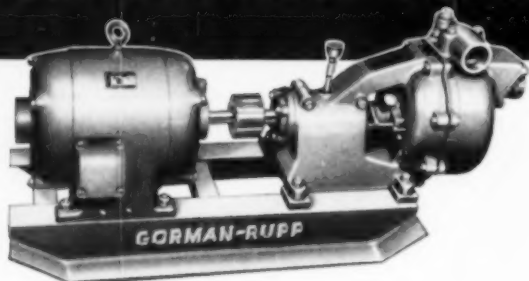
Write for your copy of the 12-page catalog that shows you how Fuller Transmissions and Auxiliaries can be applied to your job.



**FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN**

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

# LOW HEADROOM? *Simply Specify* GORMAN-RUPP PUMPS



## A LOT OF PUMP IN A SMALL SPACE

These husky, self-priming, centrifugal mine gathering pumps will handle large quantities of water yet take unbelievably small headroom - from 13½" to 21¼", depending upon size. (pump only)

Ideal for remote locations and automatic operation - requiring little or no attention, operating 24 hours a day, continuously, day after day without shut-down.

Positive and powerful self-priming. No adjustments required between prime and run - start the motor and you start the water.

Sand, muck or solids that will pass the intake strainer WILL NOT CLOG or harm a Gorman-Rupp.

Absolute Simplicity - only one moving part, the impeller - no reduction gears or valves. All wearing parts can be quickly replaced by an inexperienced man with common tools.

You can't beat a Gorman-Rupp for dependability and performance. Available in capacities from 50 to 200 GPM and heads up to 125 feet. Write today for special mine bulletin showing some interesting actual installations, or contact your nearest distributor.

*Check* THIS LIST FOR YOUR NEAREST GORMAN-RUPP DISTRIBUTOR

Guyan Machinery Co., Logan, W. Va.  
Weinman Pump & Supply Co., Pittsburgh, Pa.  
McComb Supply Co., Harlan, Ky.  
Bittenbender Co., Scranton, Pa.  
Industrial Supply Co., Terre Haute, Ind.  
Hoe Supply Co., Christopher, Ill.  
Greenville Supply Co., Greenville, Ky.  
General Machinery Co., Birmingham, Ala.  
Superior Sterling Co., Bluefield, W. Va.  
Athens Armature & Machinery Co., Athens, Ohio.

Tennessee Mill & Mine Supply Co., Knoxville, Tenn.  
Mine Service Co., Lothair, Ky.  
Reliable Electric Co., Zanesville, O.  
Cambridge Mach. & Supply Co., Cambridge, Ohio.  
Medico Elec. Motor Co., Pittston, Pa.  
Buckeye Machine Supply Co., New Philadelphia, Ohio.  
W. Va. Pump & Supply Co., Huntington, W. Va.  
Central Mine Supply Co., Mt. Vernon, Ill.

THE



GORMAN-RUPP COMPANY

305 BOWMAN STREET, MANSFIELD, OHIO

ly acquired subsidiary, the Stokes & Smith Co., Philadelphia.

## Trade Literature

Available Without Charge on Request to the Manufacturer

**ALLOY STEEL**—Jones & Laughlin Steel Co., Pittsburgh 30, Pa. Bulletin, "For Longer Wear, Less Repair," describing new Jallo special alloy steel, said to be capable of being heat-treated to excellent physical properties, presents Jallo case histories in various fields and includes complete technical data with tables on chemical composition, grain size and physical properties.

**BAGS AND OTHER PRODUCTS**—Bemis Bro. Bag Co., 408 Pine St., Box 39, St. Louis 2, Mo. "Pocket Guide to Bemis Products" illustrates and briefly describes more than 40 general types of products and special services available from the Bemis company.

**BALL BEARINGS**—Marlin-Rockwell Corp., Jamestown, Pa. Bulletin 26, "M-R-C Ball-Bearing Interchangeable Tables," is a reference compilation of M-R-C ball bearings available for various replacement applications. Bulletin 1528-2 provides construction and specification data on the M-R-C "Synthesal" ball bearings.

**BATTERY MAINTENANCE**—Gould Storage Battery Corp., Trenton 7, N. J. Bulletin GH-1982 describes the company's line of thermometers and hydrometers especially designed for battery maintenance, including dimensions, operating instructions and prices.

**CALCIUM CARBIDE**—National Carbide Corp., 60 East 42nd St., New York 17. Booklet, "The Miracle of Calcium Carbide," traces the history of calcium carbide from the time of its discovery as a commercial possibility over 50 years ago and sketches current and potential usage of commercial calcium carbide, acetylene gas, and calcium-hydrate residue.

**CAP LAMP**—National Mine Service Co., Beckley and Logan, W. Va.; Indiana, Altoona and Forty-Fort, Pa.; Jenkins and Madisonville, Ky. Bulletin 428 describes and illustrates the construction, operation and features of the new Wheat "Forty-Niner" electric cap lamp.

**CASE HARDENING**—Dennis Chemical Laboratories, Inc., 172 Pacific St., Brooklyn 2, N. Y. Bulletin describes and illustrates the application and the use of Carburit pack-hardening paste and Isopac Isolating paste, recently developed as simple and effective methods of hardening selected metal sections.

**COAL HANDLING AND STORAGE**—Gifford-Wood Co., Hudson, N. Y. Bulletin 200 describes 14 case histories of coal-handling and storage systems and based upon the use of Gifford-Wood's four basic types of storage and handling systems, said to feature simplified design, engineering, erection, and low initial and ultimate cost.

**CORROSION-RESISTANT EQUIPMENT**—The Duriron Co., Inc., Dayton 1, Ohio. General Catalog M covers data on Duro corrosion-resisting equipment and alloys and discusses features, capacities, sizes and available alloys.

**DIESEL ENGINES**—Benjamin's for Motors, 2124 Mill Ave., Brooklyn 10, N. Y. Reprint from *Diesel Power* contains complete specifications on every commercially manufactured diesel engine, including horsepower ratings, model numbers and other data.

**ELECTRIC CABLES**—General Electric Co., Construction Materials Department, Bridgeport, Conn. Bulletin

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*Announces*

## THREE NEW DRILLS

The PARMANCO Coal Drill will drill 2½ inch holes at a speed of up to six feet per minute in #5 coal. Equipped with heavy duty truck-type transmission and rear end and a complete hydraulic feed, the drill is operated by one man from the control seat. It is made in two sizes with a 12 h.p. or 25 h.p. gas motor and all units are completely self-contained and enclosed in oil-tight cases.

### ALREADY USED by

United Electric Coal Companies 6 Enns Coal Mining Co. .... 1  
Ayrshire Collieries Corp. .... 2 Huntville Sinclair Mining Co. 4  
Big Bend Collieries, Inc. .... 1 Trux-Treor Coal Company .... 1  
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**THIS UNIT IS DELIVERING 6-INCH SHOT  
HOLES — READY FOR LOADING  
at Better Than a Foot a Minute !!!**

The new PARMANCO Hi-Speed Horizontal Drill is completely redesigned around a 40 h.p. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time — a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.

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## 29 Years is a mighty long time

For 29 years a battery of 27 Plat-O Coal Washing Tables have worked hard and faithfully for the Colorado Fuel and Iron Corporation, Pueblo, Colo. That's the report received from Paul Yarnell, Ass't Superintendent of the By-products Coke Plant.

Currently 3,330 tons of coal a day are processed for the coke plant by the 27 Plat-O Coal Washing Tables, which are now working 112 hours a week . . . have worked an average of 144 hours a week for

long periods of time. Raw coal crossing the tables is separated into refuse, boiler coal, and washed coal used for coke production. Four of the Plat-O Coal Washing Tables are used for re-wash work.

Records of long service, high capacity and low maintenance costs are typical of Plat-O Coal Washing Tables wherever coal is mined and processed. For full information about these performance-proved tables, write the Deister Machine Company.



**DEISTER MACHINE CO.**  
FORT WAYNE 4, INDIANA

19-269, "Selection of Proper Cable Sizes," outlines the method of determining cables and cable sizes of asbestos-varnished cambric cables, Types AVA, AVB, and AVL. Step-by-step instruction is given on figuring load current, voltage drop, cables, and cable sizes for both lighting and motor loads, with reference tables to simplify these computations.

**ELECTRODES**—American Manganes Steel Division, American Brake Shoe Co., 230 Park Ave., New York 17. Bulletin CC-3, a new selector and comparison chart of hardfacing rods and electrodes, lists each of Amso's welding rods and electrodes, indicates the type of service for which each is designed, and includes metallurgical and physical descriptions of each rod arranged to simplify selection.

**FREEZPROOFING COAL**—Calcium Chloride Association, Ring Bldg., Washington 6, D. C. Bulletin CoB-1 outlines methods of freezproofing coal with calcium chloride, with details of application, quantities required, etc.

**GENERATORS**—Electric Machinery Mfg. Co., Minneapolis 13, Minn. Bulletin 2200-PRD-196 outlines the points to look for when ordering large ac generators and covers construction features together with recent installations of large slow-speed engine-type generators.

**HOSE COUPLINGS**—Hose Accessories Co., Lehigh & 17th Sts., Philadelphia 32, Pa. LE-HI Bulletin 5 describing the complete line of LE-HI suction and water hose couplings covers LE-HI hose combination male hose nipples, brass and malleable suction and water hose coupling, hose pipe and adapters, including several new items not previously cataloged.

**INDUSTRIAL-WASTE TREATMENT**—American Well Works, Aurora, Ill. Manual 149, "Modern Processes and Equipment for Sewage and Industrial Waste Treatment," illustrates and describes American processes and equipment for activated sludge, bio-activation, jet aeration, mechanical aeration, screening, grit removal, pre-treatment, sedimentation, trickling filters, sewage and sludge pumping, and industrial waste treatment and recovery, including flow sheets and installation views.

**MAGNETIC EQUIPMENT**—Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee 14. Catalog C-5000A describes the Dings line of electric and non-electric magnetic equipment and includes brief specifications, applications and features.

**MAGNETIC RELAYS**—Ward Leonard Electric Co., Mt. Vernon, N. Y. Catalog D-20A illustrates and describes seven standard types of magnetic relays for industrial and general-purpose control applications and includes data on relay ratings, dimensions, coil specifications and applications.

**MEASURING SYSTEM**—General Electric Co., Schenectady 5, N. Y. Bulletin GEA-5232, which describes the newest General Electric telemetering equipment for electric power distribution and industrial applications, provides detailed information on the frequency type, torque-balance-type and photo-electric-type GE telemeters, units designed to indicate or record measurements at a spot remote from the operation. Included also are simple wiring diagrams of typical telemetering installations for various services, as well as descriptions, dimensions and specifications.

**PACKINGS**—Greene-Tweed & Co., North Wales, Pa. Bulletin TBPR-619 on Palmetto Pisto-Ring packing covers the new reciprocating-pump packing recently introduced to replace hydraulic duck and other forms of packing used in inside-packed reciprocating pumps. Bulletin TB-918 on Palmetto G-T Ring packing describes this non-extrusion packing for reciprocating, static and special applications up to 10,000 psi. Bulletins include applications, design, features, etc.

# *The* Labor Union Monopoly Bites *ALL* Workers

---

*What kind of government is it which:*

... Prosecutes the Great Atlantic & Pacific Tea Company which it asserts handles about 6½% of the retail food distributing business as an illegal monopoly in restraint of trade, and

... Seeks to break up four big meat packing companies and make them into 14 companies, charging the four with being a monopoly in restraint of trade, but

... Makes no move whatsoever to apply the federal anti-trust laws to the exercise of virtually 100 percent monopoly control of labor in the coal industry, and the only slightly less complete monopoly control of labor in the steel industry?

The answer to that question is simple. It is class government of the most flagrant type, a government by which special privileges are dispensed without justice and to the great injury of all workers. It is the kind of government which will lead to the early sacking of the American enterprise system and the personal freedoms of workers.

In legal terms the explanation of this flagrant affront to good government is also simple. In 1932 labor union activities were given virtually complete exemption from the application of the federal anti-trust laws by passage of the Norris-LaGuardia Act.

*continued on next page*

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When the Norris-LaGuardia Act was passed labor unions were relatively weak. Only about 16% of the nation's industrial workers were organized, only about 12% of the steel workers. About two-thirds of the coal miners were union members, but only half that number were paying dues. The country was in the depth of its worst depression. The unemployment of about one-fourth of the labor force made monopoly control by labor seem so remote as to be almost fanciful.

But after only seventeen years devoted to the promotion of labor union organization by the federal government, we have labor monopoly with us. In its power and scope it makes the alleged business monopolies being prosecuted under the federal anti-trust laws seem positively piddling. In its manners it makes the old-time business monopolists look like Lord Fauntleroy.

What is lacking, grievously lacking, is action by Congress; action to shape our federal anti-trust laws to take account of the labor monopoly that has become the dominant national force in our country today—a force that is leading to the loss of freedom of all workers.

Before labor monopoly is broken up, as it must be broken up if our economy is not to be permanently wrecked, other steps will no doubt be required. But one test more than any other will be the touchstone of the nation's determination to keep its economic and personal freedom. It is what it does to see that labor monopoly re-

ceives the same treatment under the federal anti-trust laws as any other kind of economic monopoly.

The purpose of the federal anti-trust laws is to break up monopoly and preserve fair competition in the United States. It is a fine purpose. The wisdom and fairness of its application in particular cases is often open to challenge. But in spite of bad administration every farsighted business man I know is a staunch defender of our national anti-trust policy.

At present, in the exemption of labor monopoly, we have a breach in that policy which, if not closed, will soon become fatal both to the policy and the enterprise system it is designed to foster and protect.

The main thing wrong today with Great Britain and indeed all Europe is that no effective anti-trust laws are in existence to protect the public from business and labor monopolies, to guarantee personal freedoms. No free economy in Europe or America can prosper as long as protected monopolies remain and flourish.

While your representatives in Congress are home with you talk to them about the special privileges now granted to labor union monopoly. You would serve your country well by finding out what they intend to do about it before it is too late.



*President, McGraw-Hill Publishing Company, Inc.*

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Manhattan Belting Engineers set out specifically to solve the problem of lowering conveyor belt maintenance costs. They designed a belt that troughs easier in the idlers; a belt that cushions impact of heavy shock loads with a rebounding quality that means longer belt life.

The new conveyor belt was named HOMOCORD, a homogeneous rubber-and-cord construction that soon inspired the term, "Rippling Muscles". It flexes and absorbs the terrific punishment of long mine loads like the muscles of a mighty wrestler's back. Homocord

construction is made *only* by Manhattan and designed *only* for conveyor belt use.

If you haven't "discovered" Homocord, be sure to ask for a demonstration of its cost saving advantages in your mining operations.

#### RAY-MAN RAYON CORD "TENSION MASTER"

For longer lifts requiring fewer transfer points . . . another Manhattan Conveyor Belt Development.

*Keep Ahead with Manhattan*

*Complete Line for Mines*

Hose, Transmission Belting, Trolley Wire Guard and Other Rubber Products Engineered by Manhattan with 56 Years of Leadership in Service to Mining



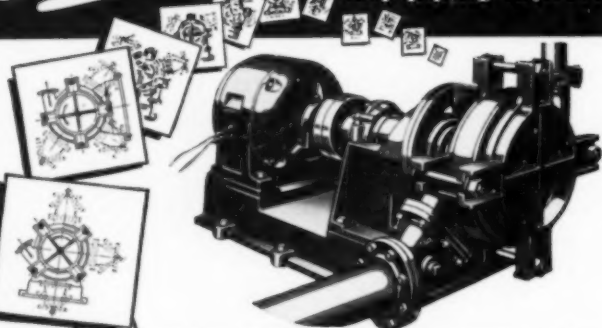
## RAYBESTOS-MANHATTAN INC.

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*Easily* installed in almost  
any piping layout!



## MORRIS TYPE "R" SLURRY PUMP

has 72 different combinations  
of nozzle locations . . .

● The suction disc swivels on the hooded bearing frame fit. This means that you can put the suction nozzle in almost any position, including the vertically upward position. This location is particularly convenient if you intend to put the pump directly under a suction tank or chest.

● The shell of the Morris Type "R" Slurry Pump is also simply constructed with extra heavy wall thickness. Its symmetrical shape permits either right or left hand rotation. By swiveling on the suction disc, you can get eight different positions of the suction nozzle.

### Other features of the Morris Type "R" Slurry Pump

#### EASY DISMANTLING

You can renew the impeller and shaft sleeve without disturbing the suction and discharge piping or bearings.

#### ALL-TIME LOW IN STUFFING BOX MAINTENANCE

The Morris Type "R" takes its suction from the drive side only. Equally reliable under high suction pressure . . . high vacuum and high suction lift.

#### LONGER TROUBLE-FREE OPERATION

The Morris Type "R" does not have internal studs or bolts. The liner is firmly clamped in position, shoulder-fit between disc and shell.

#### FOR MINING OPERATIONS

The Morris Type "R" Slurry Pump handles all types of mixtures containing abrasive solids and chemicals in suspension, including acid slurries and sludges . . . and slurries containing soda ash, ore concentrates, tailings, slag, coal, etc.

### MORRIS MACHINE WORKS

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Branch Offices in Principal Cities

**MORRIS** Centrifugal Pumps

**POWER TOOLS**—Independent Pneumatic Tool Co., 175 State St., Aurora, Ill. Catalog E-2 covering the entire Thor universal electric portable power-tool line, including Silver Line tools, offers complete data and prices. Circular JE-1131 describes the new Thor Silver Line 4½-in universal electric belt sander.

**PUMPS**—Byron Jackson Co. Pump Division, Terminal Annex Box 2017, Los Angeles 54. Bulletin 49-6600 describes Byron Jackson's line of VMT pumps designed for handling hot or cold and corrosive or non-corrosive liquids where the net positive suction head is limited and the pumps are available in five sizes, with 6-, 8-, 10-, 12- and 14-in barrels and capacities up to 1,000 gpm at heads up to 250 psi, and with standard materials, for temperatures to 250 F. Larger sizes can be furnished to 5,000 gpm.

**PUMPS**—Nagle Pumps, 1249 Center Ave., Chicago Heights, Ill. Catalog 4996 covers the Nagle line of industrial pumps for abrasive applications and also priming indicators, including applications and specifications for all Nagle centrifugal pumps and data on installation and design.

**RESISTOR**—Euclid Electric & Mfg. Co., Madison, Ohio. Bulletin 1913 covers the construction and application of the improved Expandohm edge-wound resistor featuring an expandable core bar that eliminates bucking as a result of expansion.

**SNOW THAWING**—Chem Industrial Co., 1114 Hippodrome Bldg., Cleveland 14, Ohio. Bulletin on "Melt" ice and snow-thawing chemical powder, contains complete application directions for the product which, in small pellet form, is said to possess 12 times the thawing capacity of salt.

**STARTERS**—Allis-Chalmers Mfg. Co., 968 S. 70th St., Milwaukee, Wis. Bulletin 14B7274 describes the oil-immersed full-voltage Type 371 wall-mounted starter for control of squirrel-cage motors and the primaries of wound-rotor motors of 350 hp or less at 2,300 v, with detailed data on construction, application and specifications.

**TURBINES**—DeLaval Steam Turbine Co., Trenton 2, N. J. Catalog 4200 on DeLaval multi-stage turbines discusses the economics of by-product power, along with diagrammatic sketches that show the utilization of heat for various typical plant-operating conditions. Construction, design and applications are included for the basic types of DeLaval turbines for different operating conditions and applications up to 20,000 hp.

**VALVES**—Kennedy Valve Mfg. Co., Elmira, N. Y. Circular 102 describes the Fig. 27 and Fig. 39 line of standard bronze gate valves, covering design features, service ratings, sizes and dimensions.

**WIRE ROPE**—Jones & Laughlin Steel Corp., Pittsburgh 20, Pa. Booklet on J&L CenterFit wire rope contains complete technical data, with summaries of various successful field applications of CenterFit on clamshells, shovels, draglines, bulldozers, scrapers and industrial hoists.

**WIRE ROPE**—Macwhhyte Co., Kenosha, Wis. Bulletin contains data on construction, application, capacities and weights of Macwhhyte corrosion-resisting preformed wire rope, available in both stainless steel and Monel metal.

**WELDING**—Air Reduction Sales Co., 60 E. 42nd St., New York 1. Bulletin on Heliwelding, an inert-gas shielded-arc welding process, explains the process and how to use it, with data on equipment for manual, semi-automatic and automatic operation, a new automatic filler-wire feeder and power-supply equipment.



# TELSMITH

## *more efficient screening* VIBRO-KING

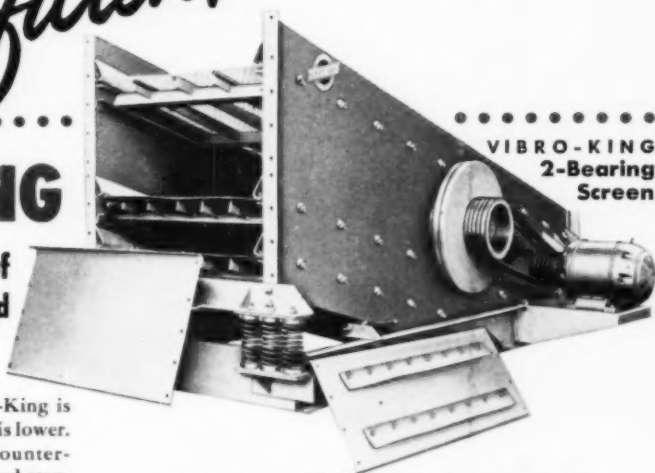
**For Finished Screening of  
Medium and Small Sized  
Aggregate**

With its two bearings, the Vibro-King is simpler, more efficient, and upkeep is lower. TelSmith-patented automatic counterweights assure smooth starting and stopping as well as exceptionally smooth operation. Its circular screening movement is uniform everywhere on the screen cloth, and is constant under any load. Entire vibrating mechanism, including vibrating unit and screen cloth, floats on nests of springs. Welded and reinforced main frame is horizontal for rigidity and easy installation. Cable suspension, if desired. Five sizes, 1, 2, or 3 decks.

## PULSATOR

**For Heavy-Duty Scalping**

A four-bearing, heavy-duty vibrator... for all kinds of screening, especially scalping, or large sized aggregate... Pulsator's circular movement gives uniform, efficient screening on all decks and under heaviest loads. The best alloy steels, the finest anti-friction bearings, protected by both labyrinth and piston ring seals, give longer life and lower upkeep. Eleven sizes, with 1, 2 or 3 decks.

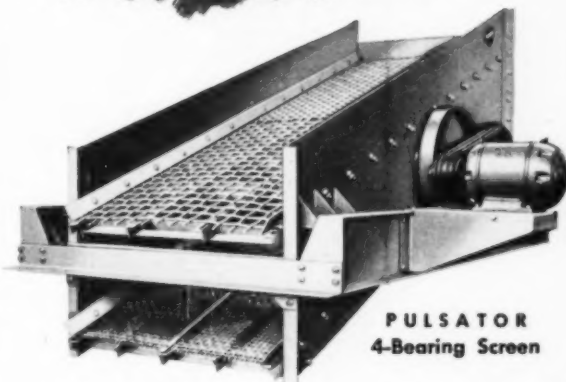


VIBRO-KING  
2-Bearing  
Screen

**Changing Screen Cloth is Simple and Quick**—The upper end of the Vibro-King is readily removable, making it a much easier job to change screen cloth and saving a great deal of time.

**Screen Cloth Mounting**—At customer's option—screen cloth may be mounted in rubber on steel screen trays; or stretched over steel screen supports—protected by rubber—on any deck or decks.

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PULSATOR  
4-Bearing Screen

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Brandels M. & S. Co., Inc. Louisville 8, Ky.	Rish Equipment Co. Charleston 22, & Clarksburg, W. Va.	Rish Equipment Co. Roanoke 7, & Richmond 10, Va.	Tractor & Eqt. Co., Inc. Birmingham 1, Ala.		

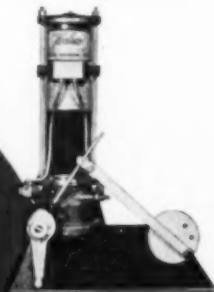
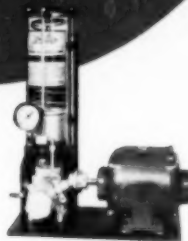
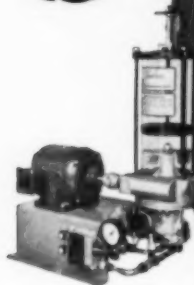


*"Trabon systems operate efficiently when  
buried under coal dust, water, or grime."*

# Trabon

Leads in

## AUTOMATIC LUBRICATION



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OF BULLETIN 469.

# Trabon

OIL AND GREASE SYSTEMS

• Backed by 20 years of experience in engineering and installing lubrication equipment, Trabon assures reduced maintenance costs and better tonnage flow on your operation. Trabon oil and grease systems have ONE indicator at the pump — every bearing gets its full measured amount. Trabon systems are SEALED — no exposed parts.

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# News Round-up



**WIDE WORLD**  
JOHN L. LEWIS, flanked by John Owens (left), UMW secretary-treasurer, announces the surprise back-to-work order at the conclusion of the union policy board meeting in Chicago Nov. 9. Operator group, shown being told of union truce by Cyrus Ching (seated, right), chief of the Federal Mediation Service, spent the following day waiting vainly for Lewis to show up for the scheduled meeting. Operators here are T. G. Gerow (left), Hugh B. Lee, Harvey Cartwright, George Love, William Wetter and Frank Amos.

## Lewis Truce Breaks Mine Stoppage

IN A SURPRISE MOVE designed in part to stave off imminent government action under the Taft-Hartley Act, John L. Lewis Nov. 9 ordered striking bituminous miners east of the Mississippi back to work for a three weeks' truce scheduled to end Nov. 30. While the probability of government intervention had loomed stronger in the several days previous, reports of increasing miner discontent caused by the lack of over seven weeks' income with the holidays approaching also were thought to be a consideration in Mr. Lewis' action.

Future action by the government was indicated Nov. 17, when Pres. Truman in his press conference announced that if he took action in the dispute, it would be based on the Taft-Hartley Act, but only in case of an emergency. When he felt such an emergency would warrant his recourse to the Act, the President would not say. The previous day, Cyrus Ching, chief of the Federal Mediation Service, had put the matter in the President's hands, reporting that further mediation would be useless and that he felt that the union and operators were further apart now than earlier in the negotiations.

No hint of the union's probable course after expiration of the truce on Dec. 1 was disclosed by Mr. Lewis in his return-to-work order, which, he said, was "an act of good faith designed to contribute to the public convenience." Presumably, miners would again stop work without a contract.

Mediation efforts carried on intermittently over several weeks broke down completely Nov. 10 when Mr. Lewis failed to attend a conference

with operator representatives scheduled by Mr. Ching in Washington that day. Replying to a telegram from Mr. Ching inviting him to the meeting, Mr. Lewis advised that miner representation would be present the following Monday. A second telegram by Mr. Ching seeking to clarify the reply brought a response from the union leader that the UMW would be fully occupied until Monday in securing resumption of production. Mr. Ching canceled further mediation and announced to the public that the government "would not sit around and wait" if Nov. 30th brought a new stoppage.

Convening the 200-man union policy board in Chicago Nov. 7, instead of calling it to Washington as has been the usual procedure, was reported to be a stratagem by Mr. Lewis to set the stage for making separate contracts with Illinois and Indiana operators. Governors of both states were approached to set up state-wide negotiations designed to ease the fuel situations in their respective states. Both Indiana and Illinois operator groups flatly turned down the attempts to coax them away from the national negotiations. "The issues in-

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volved are national in character and cannot be reconciled to district negotiations," Harvey Cartwright, secretary of the Indiana Coal Operators' Association, stated Nov. 2, pointing out that the national negotiating conference could be reconvened if Mr. Lewis thought constructive results might be obtained. Several days later, Mr. Lewis bitterly attacked George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co., accusing him of blocking all possible resumption of mining in Illinois.

Further negotiations appeared to be stalled indefinitely, following the collapse of mediation. The union president issued several statements bitterly assailing the operators for the situation and maintaining that he would meet with anyone who might have a solution. However, he made no move to initiate such talks and it has been reported that he still has not made definite his demands for a new contract. The union's requirements for a new contract would cost 30 to 35¢ a ton, it was reported some time ago.

Fines totaling \$1,420,000 levied against the UMWA and Mr. Lewis for failure to obey a court order during the 1948 stoppage issued by Judge T. Allan Goldsborough were paid Nov. 15, after the Supreme Court refused to review the appeal from the contempt of court conviction.

Dramatic reduction in the administrative personnel of the UMWA Welfare and Retirement Fund was reported Nov. 14 by Miss Josephine Roche, director, as a result, she said, of the action taken by Sen. Bridges and Ezra Van Horn in voting to prevent further expenditures of royalties collected since expiration of the contract June 30. In his reply to the suit brought by George H. Livengood, a miner who charged trustees with dissipation of the Fund, Mr. Van Horn told the federal district court in Washington Oct. 28 that the charges were true but that Sen. Bridges and Mr. Lewis were solely responsible. The other two trustees ran the Fund like a closed shop from which he was excluded, he said, and would not make a satisfactory audit or give him access to the records. Large sums of money were paid to persons not entitled to them, he reported, Sen. Bridges Nov. 1 called Mr. Van Horn's charges



Wide World

### Operators Name Dawson Welfare Fund Trustee

Former Judge Charles I. Dawson, Louisville, Ky., was appointed operator trustee for the UMWA Welfare and Retirement Fund Nov. 3, replacing Ezra Van Horn, who resigned some time ago subject to the appointment of a successor.

Judge Dawson's appointment was formally announced with release of a letter to the fund trustees from Truman E. Johnson, secretary of the Operators' Negotiating Committee of the National Bituminous Coal Wage Agreement 1948, who reported that operators representing more than 51% of the 1948 tonnage had voted by mail ballot to accept Mr. Van Horn's resignation and appoint Judge Dawson.

Judge Dawson, who has served as counsel for the Harlan Coal Operators' Association, is a senior partner of the law firm of Bullitt, Dawson & Tarrant, Louisville. He was formerly a federal judge, served a term in the Kentucky House of Representatives and at one time was Kentucky attorney general.

"ridiculous" and said that he welcomed a full and impartial investigation by the court of his acts and conduct as the neutral trustee.

### Utilities Form Firm to Supply Gas to New England

Algonquin Gas Transmission Co. has been organized by several gas-utility companies to provide natural gas in the northeastern states. Sponsors of the new company include the New England Gas & Electric Association, Providence Gas Co., and Eastern Gas & Fuel Associates, which reportedly produced more than 50% of the gas distributed in 1948 in Connecticut, Massachusetts and Rhode Island.

An investigation of the most effective means of supplying natural gas to the area is now being carried on for the company by Ford, Bacon & Davis, Inc., New York engineering firm, and is expected to be completed shortly. If it is found expedient to construct a pipeline into the area, an application will be filed with the FPC, it is reported.

### Philadelphia to Pay for Shenandoah Mine Cave-in

The borough and school district of Shenandoah, Pa., was awarded nearly \$900,000 in damages from the City of Philadelphia, Nov. 1, as a result of a cave-in over the Kehley's Run mine in March, 1940. The damages were awarded by a Philadelphia Common Pleas jury in suit brought against the city as trustee of the Stephen Girard estate, which had leased the mine to the Morea Coal Co. in 1938. The jury found the city negligent in entering into the lease, even though counsel for the city maintained that it had no knowledge that the mine was unsafe and that it was the duty of the mine operators to provide for such factors. The cave-in, which reportedly resulted from lack of proper supports, affected a 16-block area. A new trial and, if necessary, an appeal to the state Supreme Court would be sought, counsel for the city said.

### Miners Want Work Return Indiana Survey Reports

Some 42.5% of the miners questioned in the Bicknell-Linton-Dugger area said that they would "return to the mines at present wages, hours and working conditions" if they had a chance to vote on the question, according to a survey reportedly conducted by Indiana University recently. Of those questioned, 46% said they would not return until an agreement was made and 11.5% either did not know or did not answer.

Whether there should be a full and impartial investigation and audit of the Welfare Fund was answered "Yes" by 57.5%, with 25.9% against and 16.6% expressing no opinion.

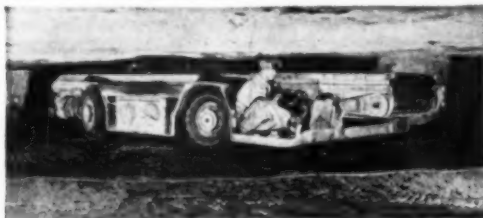


**THIS MONTH'S COVER** takes you underground at the Clipstone colliery, Chesterfield, England, with a view of one of the 20 A. B. Meco-Moore cutter-loaders now operating there. With a six-man crew, this machine cuts and loads a ton every minute under favorable conditions. For a comprehensive review of the new cost-cutting machinery in use or under development in Britain and Europe, turn to "Mining Machinery Abroad," starting on p. 70.—Photo by Keystone Pictures, Inc.

# NEW EQUIPMENT OFTEN REQUIRES ADVANCED TYPE LUBRICANTS



2. NEW TRANSPORTATION UNITS give dependable, top notch performance only when serviced with fine, fresh lubricants. Cities Service has the right lubricant for every haulage operation.



3. NEW CUTTERS AND LOADERS perform best with the right lubricant. Get the advice of a Cities Service lubrication engineer before putting them in service.

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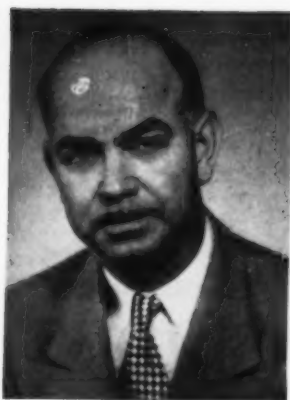
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# CITIES SERVICE





### Acquisition of Oliver Coal Brings Changes at Calumet Fuel

RONALD C. OLIVER (upper left), partner, Oliver Coal Co., has been named operations manager for The Calumet Fuel Co., following Calumet's purchase of the Oliver organization. Mr. Oliver, whose headquarters will be in Denver, will be in charge of Calumet's three Colorado mines. S. C. Harvey (upper right), formerly superintendent of Calumet's Somerset mine, has been appointed general superintendent, Somerset and Oliver mines. Gomer Reese and Carl Smith (lower left and right) have been advanced to superintendents of Somerset and Oliver mines, respectively.

### Personal Notes

Sinclair Coal Co., Kansas City, Mo., has announced several changes of personnel among its subsidiary companies. Cecil Wilkinson, formerly superintendent of the Old Mac Coal Co., which was closed last spring, was transferred this summer as superintendent of the company's new stripping operation, the Pershing Coal Co., Tracy, Iowa (*Coal Age*, August, p. 128). Lester Odum, assistant superintendent at Old Mac, has been made assistant superintendent at Pershing Coal Co. Howard Frisbie, assistant superintendent, Broken Aro Coal Co., recently was advanced to superintendent, Eagle Cherokee Coal

Co. Cecil M. Guthrie, general superintendent (eastern division) and purchasing agent, has been relieved as purchasing agent to devote full time to his duties as general superintendent. C. E. Mattox, formerly superintendent, Sooner Coal Mining Co., has been named purchasing agent for the company.

Thomas E. Gettings, for the past two years safety director, Lorain Coal & Dock Co. and Lorado Coal Mining Co., Columbus, Ohio, has been transferred to the companies' Cleveland sales department and will represent them in northeastern Ohio. Mr. Gettings, who majored in mining engineering at Penn State, was first associated with the Mine Safety Appliances Co., was safety director for

three mines of the Hanna Coal Co. and also was associated with the Rail & River Coal Co. Following war service with the Marines, he was with the Division of Safety and Hygiene of the Ohio Industrial Commission in mine safety work and joined Lorain-Lorodo in December, 1947.

John A. Stachura has been named general superintendent, Enoco mine, Enoco Collieries, Inc., Bruceville, Ind., a subsidiary of the Enos Coal Mining Co., according to an announcement by George E. Enos, vice president of the parent company. Mr. Stachura, who for the past year has served as a Pennsylvania state mine inspector, formerly was employed at the Harwick and Warwick mines of the Duquesne Light Co.

Harold B. Wickey resigned Nov. 12 as an assistant to the vice president, Consolidation Coal Co. (W. Va.), Fairmont, W. Va., to join the Pennsylvania Coal & Coke Co., Cresson, Pa., as general manager.

J. Bruce Clemmer has been appointed regional director of Region 7 of the U. S. Bureau of Mines, with headquarters at Tuscaloosa, Ala. Mr. Clemmer, who has been with the Bureau for more than 20 years, previously was chief of the Tucson, Ariz., branch of the former metallurgical division of the Bureau. Region 7 includes the states of Tennessee, North and South Carolina, Georgia, Alabama, Mississippi and Florida.

George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co., last month was honored by The Newcomen Society in North America as the main speaker at the annual Chicago dinner held Nov. 3. Mr. Harrington, who spoke on "Coal Mining in Illinois," was introduced by Col. Ralph Budd, chairman of the board of the Chicago Transit Authority and senior vice chairman of the group. Gen. Charles G. Dawes, chairman of the board, National Bank & Trust Co., and chairman of the Chicago Newcomen, presided at the dinner.

### Obituaries

John Rodenbush, 70, general superintendent, Chicago, Wilmington & Franklin Coal Co., Benton, Ill., died Nov. 1 in West Frankfort, Ill., of a throat ailment from which he had suffered for the past two years. Mr. Rodenbush, who began his career as a miner at the age of 16, was widely known throughout the state and formerly was superintendent of the company's New Orient mine.

P. J. McGraw, 69, West Virginia state mine inspector, died Oct. 29 at a Baltimore hospital, following a long illness. Mr. McGraw was at one time superintendent of a Grant Town, W.



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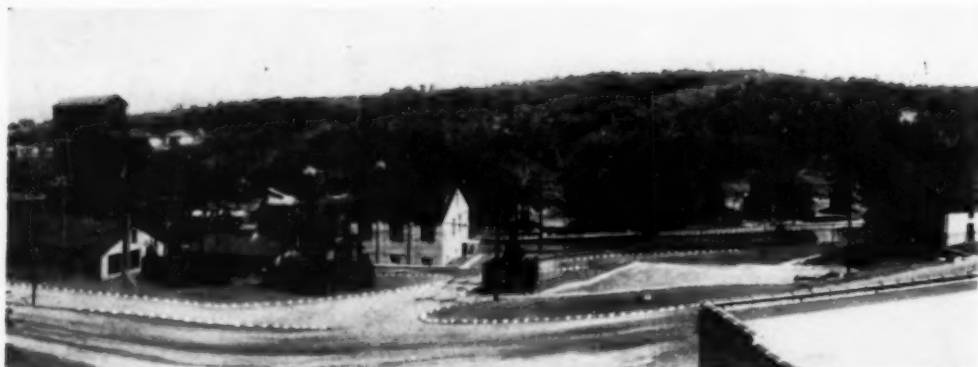


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## Extensive Improvement Program At Johnstown Coal & Coke

MINE BUILDINGS at Portage No. 4 mine, Johnstown Coal & Coke Co., Portage, Pa., are shown above as an extensive improvement program was being completed. Modernization of buildings, painting, grass and shrub plantings, edging of walks and roads, and replacement of a steam hoist with a new electric hoist were but a few of the steps taken to make the operation more efficient and attractive to the eye. A similar program of modernization of the Miller Shaft community is illustrated by this recent photo (right) of typical company-owned houses.



Va., mine now operated by Eastern Gas & Fuel Associates.

**Crispin Oglebay**, 73, chairman of the board, Oglebay, Norton & Co., Cleveland, died unexpectedly Oct. 23 at his Gates Mills, Ohio, home. Mr. Oglebay also was president of the Brules Smokeless Coal Co. and was an officer or director of numerous mining, steel and other industrial organizations. He became head of Oglebay Norton in 1924.

**Holmes A. Davis**, 64, former Pittsburgh coal operator died Oct. 20 in St. Luke's Hospital, Chicago. Mr. Davis at one time had been president and operator of 10 coal and coke companies in the Pittsburgh area and at the age of 17 was reported to be the youngest operator in the industry.

**Justin Trader**, 66, operator of the Low Moisture Coal Co., Providence, Ky., and reportedly owner of extensive coal lands in Kentucky, died Oct. 13 in Providence, Ky.

**Herman Hobbs**, general night foreman, Dorrance colliery, West Virginia Coal & Coke Co., Stirratt, W. Va., died Oct. 10, following a heart attack. Mr. Hobbs, who joined the company in July, 1939, had been general night foreman since his promotion from cone operator in September, 1946.

## New Developments

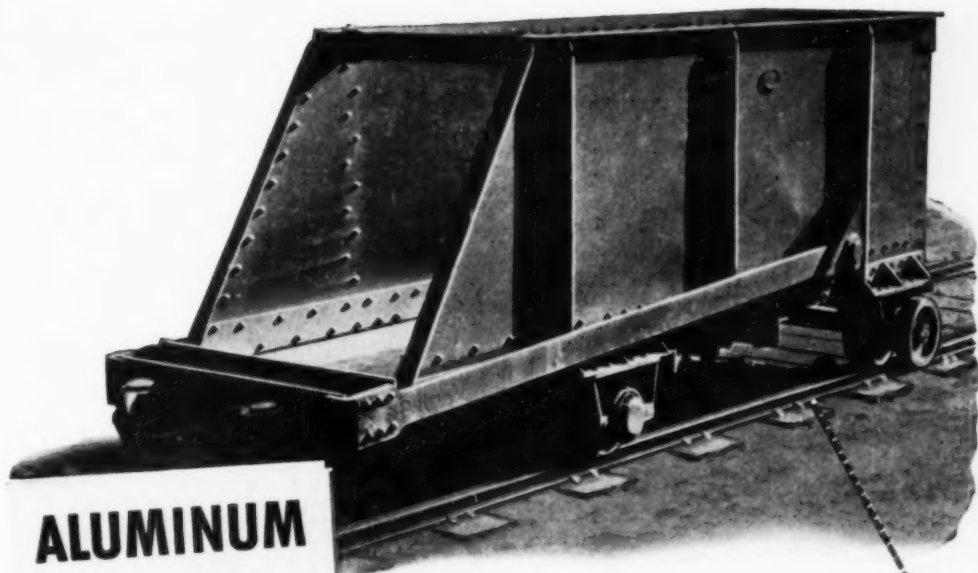
Leasing of two of the three mines formerly operated by the Jermyn-Green Coal Co., Pittston, Pa., with the expectation that they would be reopened in the near future, was confirmed last month by the Pennsylvania Coal Co., lessor of the properties. No. 6 colliery, which employed 600 men when operated by Jermyn-Green, has been leased by the Louis Pagnotti organization, which reportedly plans to resume production as soon as court proceedings permit. A large part of the Butler colliery has been leased to the Heidelberg Coal Co., and another portion, principally strippings, will be operated by Peter Minichello, of Pittston. Disposition of No. 14 colliery, the third operation involved in the Jermyn-Green shut-down, had not been announced. Sale of the mining equipment at the properties to the Pennsylvania Coal Co. was approved by the bankruptcy referee Nov. 10. As the sole bidder, Pennsylvania Coal was to pay \$116,324.20 for the equipment involved.

Purchase of the Oliver Coal Co., Paonia, Colo., by the Utah Fuel Co., Salt Lake City, recently was announced. The mine, which is a mech-

anized operation producing 600 tpd, will be operated as the Oliver mine of the Calumet Fuel Co., a Utah Fuel subsidiary. Ronald C. Oliver has joined Calumet as operations manager (see p 140) and Edwin M. Oliver will serve as general manager of the new Oliver Coal Co., a new sales organization.

**Sale by the Bethlehem Collieries Corp.** of three mines acquired last year in its purchase of the J. H. Weaver Co. (*Coal Age*, November, 1948, p 120) was reported last month. Mines Nos. 9 and 11, located on the C. & I. R.R., Indiana, Pa., and formerly known as the Redlands Coal Co., were bought by the Pine Township Coal Co., Pittsburgh. The Dawson mine, near Clarksburg, W. Va., formerly operated as the Dawson Coal Co., has been acquired by the Bird Coal Co. and will be operated by the Barnes Coal Co., Philadelphia, its wholly owned West Virginia subsidiary. Coal will be marketed by the Bird Coal Co.

**Controlling interest in the Elkhorn Coal Co.**, Kona, Ky., has been acquired by Sam L. Bastin, Lexington, and his son Arthur L. Bastin, Whitesburg, Ky. The sale, reportedly involving \$250,000, was said to include machinery, mine and town buildings, tipple



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and a large area of undeveloped coal land. The company has a daily capacity of 1,000 tons, shipping over the L. & N.

The Osage Coal Co., a subsidiary of the Pittsburgh & Midway Coal Mining Co., reportedly began operation in October at its new strip mine in Routt County, near Steamboat Springs, Colo., following a move of machinery and tippie equipment requiring some months from its property west of Ottawa, Ill., where it had operated for 12 years. The operation, which will mine the Wadge seam lying on a 10-deg pitch, will presently strip up to 70 ft of the overburden, which ranges from a shallow outcrop up to 100 ft deep. The mine has an elevation of 6,500 ft, but while as much as 4 ft of snow and temperatures of 38 below were encountered last winter during preparatory work at the site, only two days' work was lost as a result. As a part of the move, which began last April, the Monighan 9-W dragline was dismantled and, following rebuilding and repair of necessary parts, was re-erected at the new mine. Steel usable from the dismantled Ottawa tippie was sent to the United Iron Works, Pittsburgh, for refabrication before re-erection. The resulting tippie is planned to be one of the most modern and flexible in the area. It has a capacity of 400 tph and ships five sizes of coal, with both rail and truck loading. Operating personnel of the mine include: J. F. Lake, vice president and general manager; G. E. Ralston, resident engineer; Frank Barnett, pit foreman; and Harry White, top foreman.

Heil Coal Co., Martins Ferry, Ohio, reportedly is building a tippie to serve its new 1,000-tpd strip operation. The Pittsburgh No. 8 seam is to be mined and reserves are estimated at 500,000 tons.

The Dale Ridge mine of the Law Mining Co., Toms Creek, Va., has been acquired by the Virginia Iron, Coal & Coke Co. The drift operation, supplemented by truck tonnage, has a daily capacity of 1,500 tpd. Coal is loaded on the N. & W. over a 3-track tippie.

The recently organized Red Arrow Coal Co., Freeburn, Ky., reportedly has started development of a rail mine and several truck mines near Freeburn. Capacity of 1,000 tpd is planned, with shipments via the C. & O. J. W. Tomlinson Jr., Ira Estep and Arnold Mounts are organizers.

Purity Cannel Coal Co., recently organized at Prestonburg, Ky., is understood to be developing several strip operations, with an initial output of 600 to 700 tpd. Coal is to be trucked to the C. & O. Principals include Henry Hecworth, Ben Woods, George T. Roberts and Ben W. Given.

## MEETINGS

- American Mining Congress: annual meeting, Dec. 7, University Club, 1 W. 54th St., New York City.
- Coal Mining Institute of America: annual meeting, Dec. 15-16, William Penn Hotel, Pittsburgh, Pa.
- Bituminous Coal Research, Inc.: annual meeting, Feb. 9, 1950, Netherlands Plaza Hotel, Cincinnati, Ohio.

N. J. Lucas Coal Co., Whitesburg, Ky., reportedly is planning to open two truck mines on the Rockhouse Branch of the L. & N. The company recently completed two large storage bins at its recently opened mines in the Breeding's Creek area (Coal Age October, p. 159) and is understood to be planning similar installations at two other of its new truck operations. Development of two other truck operations in the Rockhouse Creek area recently has been reported. The Collins Coal Co., Colson, Ky., is said to be opening several truck mines and will reach a capacity of 800 to 900 tpd in the near future. The Lee Adams Coal Co., Jeremiah, is opening a truck mine near that town and is expected to have a tippie on the L. & N.

In the Wise County, Virginia, area, development of several new properties have been reported. The Blair-Oldham Coal Co., Whitesburg, Ky., has opened a strip operation at Duncan Gap, Va., and is expected to shortly reach an output of 600 to 700 tpd, trucking the coal 14 mi to the N. & W. at Toms Creek, Va. Crawford & Mann, Whitesburg, Ky., is said to have leased considerable coal land in the same area and to have contracted with Blair-Oldham for stripping of the 4-ft seam. The Jinks Coal Co., headed by I. J. Beverly, is understood to have begun a strip mine with an eventual capacity of 900 to 1,000 tpd. Coal is to be trucked to Bondtown, Va., for shipment via the N. & W. William Edmiston, Mayking, Ky., reportedly is developing a 400-tpd stripping in the area.

The DePuy Coal Co., Kings Creek, Ky., closed for some months, recently was reported to be planning resumption of operations, with a capacity of 800 tpd. The company formerly mined Kings Creek canal coal, loading over the L. & N. at Roxana, Ky.

dent, Laurence E. Tierney Jr., president, Eastern Coal Corp., Bluefield, W. Va.; treasurer, J. D. McLaughlin, president, Earlston Coal Co., Kermit, W. Va.; and secretary, Joseph J. Ardigio. Visitors who spoke at the afternoon business meeting included: R. E. Howe, Appalachian Coals, Inc.; J. V. Sullivan, West Virginia Coal Association; H. B. Lammers, Coal Producers' Committee for Smoke Abatement, Charles E. Bell, Property Owners' Committee; and John D. Battle, National Coal Association. Fred A. Heitzman, Old Ben Coal Corp., Cincinnati, acted as toastmaster at the annual banquet.

Kanawha Coal Operators' Association, at its meeting in Charleston, W. Va., Oct. 20, elected new officers, as follows: president, L. N. Thomas, president, Carbon Fuel Co.; vice president C. C. Dickinson Jr., Dickinson Fuel Co.; treasurer, John L. Dickenson, Kanawha Valley Bank; and executive secretary, Harry G. Kennedy. Charles E. Hodges, managing director, Charleston Chamber of Commerce, served as toastmaster at the dinner.

## Fatality Rates Continue Drop in September

Fatality rates in anthracite and bituminous mines showed marked improvement in September, 1949, and in the first nine months of the year, as compared with similar periods in 1948, according to the reports recently released by the U. S. Bureau of Mines.

In the first nine months of 1949, accidents at both types of mines caused the deaths of 443 men, as compared with 774 in 1948. Fatality rates per million tons were 1.20 and 1.60, respectively. In anthracite, the 1949 fatality rate was 2.02, as compared with 2.56 last year. The bituminous rate was 1.13 against 1.51. Falls of roof and face and haulage, in that order, continued to be the two largest causes of deaths, the two together accounting for 336 of the total 433 fatalities in the period.

Fatality rates for the two industries in September 1949 and 1948, respectively, were: anthracite, 1.440 and 2.197; bituminous, 0.980 and 1.131.

## South-East Coal Grants Kentucky Scholarship

Establishment of a four-year scholarship at the University of Kentucky totaling \$2,400 by the South-East Coal Co., Seco, Ky., recently was announced. The grant is available to company employees or their sons. William C. Preston, Seco, has been awarded the scholarship for the year 1949-50, it was reported.

## Association Activities

Operators' Association of Williamson Field, at its annual meeting in Williamson, W. Va., Oct. 28, elected the following officers: president, J. E. Briggs Jr., president, H. E. Harman Coal Corp., Harman, Va.; vice presi-



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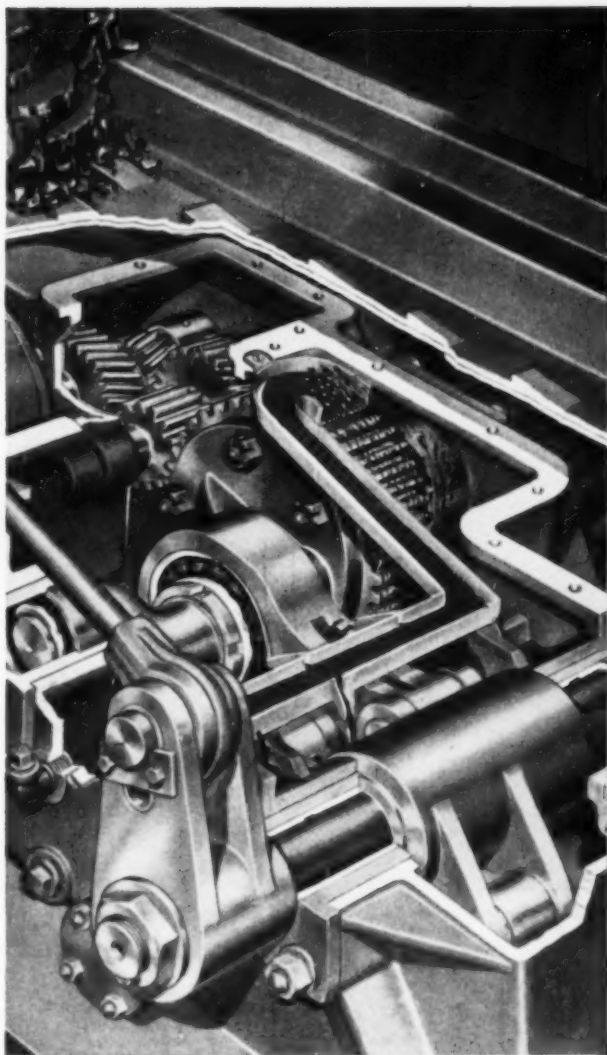
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**ROOF-BOLTING PANEL**—W. W. Hunter (left), Eastern Gas & Fuel Associates; L. W. Kelly, U. S. Bureau of Mines; James A. Gray, Tennessee Coal, Iron & R.R. Co.; J. K. Berry, Consolidation Coal Co. (Ky.); M. H. Forester, Pittsburgh Consolidation Coal Co., panel leader; and C. C. Conway, The Consolidated Coal Co.



**DUST AND ELECTRICAL HAZARDS**—C. R. Stahl (left), retiring general chairman, coal-mining section; John Harmon, U. S. Bureau of Mines; W. E. Connor, mech. supt., Lehigh Navigation Coal Co.



**SAFETY PROMOTION**—Mrs. Veda Burford (left), Colorado mine-inspection department; J. J. Plasky, Red Jacket Coal Corp.; and Arthur Bradbury, Inland Steel Corp.



**OHIO HIGH-SCHOOL QUIZ KIDS**—W. D. Northover (left), Rochester & Pittsburgh Coal Co., throws a question at John Grayzar, Lee Moore, Gabe Toth, and Harry Caesario.

## Coal Safety Group Considers Progress

**Varied Subjects Feature Meeting of Coal-Mining Section, National Safety Council—Training Stressed As Safety Men Quiz Four High-School Seniors—Roof-Bolting and Continuous Mining New Fields for Safety Studies**

**ROOF BOLTING**, dust control, electrical circuits, ventilation, training and transportation were major safety themes as over 200 coal-mining safety engineers and personnel managers met in the Coal-Mining Section, 37th Annual National Safety Council Con-

gress and Exposition in Chicago, Oct. 24-26. A panel discussion of roof bolting on the first day of the meeting and an hour-long quiz session on the last day, in which four Ohio high-school boys answered questions on coal-mine safety asked by state and

company safety officials, were high-interest spots of the three-day meeting.

For the year ahead, George Roos, vice president—operations, Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., was named general chairman of the group, succeeding C. R. Stahl, assistant operations vice president, Eastern Gas & Fuel Associates, Mt. Hope, W. Va. Arthur Bradbury, safety engineer, Inland Steel Co., Wheelwright, Ky., and Stanley Mooney, safety engineer, Woodward Iron Co., Woodward, Ala., were made vice chairmen; H. J. Sloman, U. S. Bureau of Mines, Pitts-



**SAFETY METHODS**—C. F. Davis (left), UMWA; R. T. Artz, U. S. Bureau of Mines; Dennis Keenan, Pennsylvania Department of Mines; H. A. Quenon, Eastern Gas & Fuel Associates; C. F. Herbert, Bituminous Casualty Corp.; C. E. Jones, UMWA District 29; and R. D. Currie, General Reinsurance Corp. Michael Kosik, UMWA, was not present for the photo.

burgh, Pa., was re-elected secretary. Mr. Stahl presided at all sessions.

Roof bolting generally is not intended to replace but to supplement conventional timbering, said M. H. Forester, vice president, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa., who opened the six-man panel discussion of this new method of supporting roof. Explaining the procedure, Mr. Forester stated that roof bolting involves drilling holes of various diameters and depths either vertically or at an angle into roof strata and inserting steel rods of various lengths and diameters. The rods then are tightened in place by expansion wedges or bolts, thus converting the overlying strata into a solid beam that keeps the roof in place. Thus far, equipment already in use in coal mines has been adapted for drilling holes and inserting bolts, with the result that roof bolting now is used in many mines on an experimental basis and in some few mines as the major method of roof support.

Tracing the growth of his company's interest in roof bolting, C. C. Conway, chief engineer, The Consolidated Coal Co., St. Louis, Mo., explained that 3 to 5 ft of drawslate above the coal in his company's mines was difficult to hold up even by close timbering. Now, with roof bolts placed up to within 6 in of the face before undercutting, sagging and fracturing of the roof are avoided. Conventional timbering is used to some extent in connection with roof bolting to show miners how the roof is holding up. As a further step in winning worker cooperation in the new method, the company has not asked any worker to use less timber than before roof bolting was started.

The results of roof bolting have been improved safety, elimination of slate in computing transportation costs, a saving in wear and tear on

loading machines and a better tippable product, Mr. Conway said. As for cost, he explained that roof bolting, at about \$3 per bolt for material and labor, is no more expensive than conventional timbering.

Mr. Forester pointed out that there are two schools of thought on roof bolting: (1) that bolts must be anchored in limestone or other substantial strata to a depth of some 14 in and (2) that bolts do not require a solid stratum like limestone since bolting seals weaker strata together to form a strong beam.

The experience of Tennessee Coal, Iron & R. R. Co., Birmingham, Ala., with roof bolting in coal and ore mines since early 1948 was narrated by James A. Gray, assistant manager of raw materials. Roof bolts now are used exclusively to support some 1,500,000 sq ft of roof at his company's Concord mine and about 2,225,000 sq ft of roof in his company's ore mines, plus some experimental installations in two other coal mines, Mr. Gray reported. However, the new system was not installed until after careful studies and thorough experimentation had been made on roof structures, time factors, method of anchorage, bolt strength and personnel attitudes, he explained.

Using an ordinary rivet-grade 1-in steel rod with an ultimate strength of about 33,000 lb at the threaded end and 44,000 lb at the slotted end for experiments, T.C.I. engineers found that: (1) the ratio of hole diameter and wedge thickness is critical; (2) with proper installation, anchorage strength is greater than the rod's tensile strength; (3) the best combination of hole and pin for all rock is a 1½-in hole and a 1-in-diameter pin expanded by a wedge ¾ in thick, ¾ in wide and 6 in long; (4) in soft rock, good results are obtained from a 1½-in hole, a 1-in pin and a ¾x¾x6-in

wedge; (5) in hard or thinly laminated rock, 1¼-in holes with 1-in pins expanded by ¾x¾x6-in wedges are satisfactory; and (6) a driving period of 10 sec minimum, with stopper air pressure above 80 psi, assures sufficient hammering of the pin and wedge to obtain maximum expansion of the slotted rod.

Although there have been two roof failures in the Concord mine, neither was caused by anchorage or pin failure but by failure of rock strata at least 2 ft above the anchorage point, Mr. Gray said. Both failures occurred after the area had been exposed for several months and when the mine was not working. One minor accident from falling roof occurred after the loading machine had cleaned up a fall and before the bolting crew had installed pins to the face but could have been prevented by proper use of roof jacks. Experience shows that faults, slip planes, wet slips, rock boulders, rolls and basins may require twice the normal number of bolts and that slip planes and wet slips should be pinned immediately with angled bolts that pass through the slip and are anchored beyond the break in roof strata.

Benefits of roof bolting, Mr. Gray concluded, are as follows: (1) no accidents from falls of roof or coal attributable to roof-bolt failure, though the hazards of falling ribs still exist; (2) improved quality of tippable-weight product; (3) reduced cost where roof bolting has replaced cross collars; and (4) miscellaneous improvements such as increased efficiency of mobile haulage units, better ventilation, improved housekeeping and less time required for hanging cables, curtains and air lines.

"Good roof in place of bad—that is what roof bolting has given us," said John K. Berry, production engineer, Consolidation Coal Co. (Ky.), Jenkins, Ky. Working a 42- to 60-in seam, his company has adapted a timbering machine for drilling and bolting roof, Mr. Berry explained. The machine is so arranged that roof holes are drilled to a uniform depth. However, arcing of the timbering-machine arm on which the drill has been mounted makes it difficult to drill a straight hole. This and other considerations show the need for a specially-made roof-bolting machine, with promise of a growing market for the manufacturer who designs and produces one, he declared. Such a machine should be designed for: (1) protecting the motor and gears from dust; (2) raising and lowering the drill vertically, probably by a hydraulic system; and (3) one-man operation.

"We definitely are substituting roof bolting for conventional timbering in our 38-in seam and have placed 7,000 bolts since April, 1949," said W. W. Hunter, superintendent, Coal Division, Eastern Gas & Fuel Associates, Statesbury, W. Va. Bolting was begun after the coal had been removed

(Continued on p 164)



Art James (left), master mechanic; Bob Hert, chief electrician; Charles Garrett, electrician; Charles Whitesell, chief electrician; and H. S. Lowry, electrical engineer, Green Valley mine, Snow Hill Coal Corp., Terra Haute, Ind.



Stewart Brown (left), check weighman; Clarence Street, weigh boss; Eliegy Bartosh, mine foreman; and Wade Parrine, chief electrician and master mechanic, No. 5 mine, Crystal Block Coal & Coke Co., Roth, Va.

## COAL MEN ON THE JOB



Frank St. Clair (left), transitman; Neil Forman, draftsman; William Bernard, company construction engineer; and Michael Slepisky, resident engineer, Arkwright mine, Christopher Coal Co.



Eddie Powell (left), night mine manager; William Christian, John Hunsick and Ed Owens, facebosses, Lake Creek mine, Consolidated Coal Co., Johnston City, Ill.



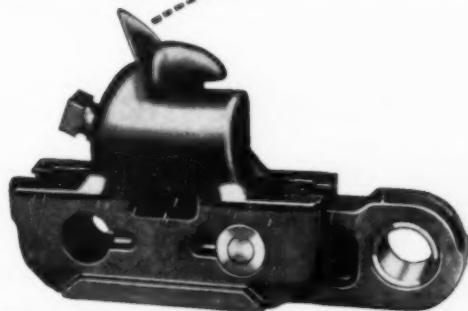
John W. Hunley (left), tipple foreman, 20th Century Coal Co., Inc., Beaver Dam, Ky.; T. C. Hamil, assistant superintendent, Sycamore Coal Co.; B. P. Preefer, tipple foreman, and Lawrence Hunt, chief electrician and master mechanic, Sycamore Coal Corp., Patterson, Va.



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OFFICIALS AND DINNER SPEAKERS—B. E. Schonthal (left), re-elected secretary-treasurer; G. Stuart Jenkins, new institute vice president; T. G. Gerow, new president; J. Roy Browning, retiring president; Edward A. McFaul and Henry C. Woods, guest speakers.

## Illinois Surveys Mining Scene

**Training, Transportation, Accounting, Continuous Mining, Preparation, Power and Stripping Feature Illinois Institute Meeting, With Honors to Past and Present Officials and Mining Students as Additional Highlights**

WITH A MEMBERSHIP grown to over 1,200 and with 740 at the annual dinner, the 57th annual meeting of the Illinois Mining Institute, held at Hotel Abraham Lincoln, Springfield, Ill., Oct. 28, delved into mining, preparation, mine accounting and education; honored its living past presidents, named four new honorary mem-

bers and especially remembered its secretary-treasurer.

T. G. Gerow, executive vice-president, Truax-Traer Coal Co., Chicago, was elected president for the coming year, succeeding J. Roy Browning, commissioner, Illinois Coal Operators' Association, Chicago. G. Stuart Jenkins, vice president, Consolidated Coal

Co., St. Louis, was elected vice president, and B. E. Schonthal, B. E. Schonthal & Co., Chicago, was again chosen secretary-treasurer, his reelection being especially marked by a testimonial book bearing the signatures of 771 members of the Institute and dedicated as follows:

"Bela Schonthal for untiring service and skillful guidance in administering the successful achievements of the Illinois Mining Institute; for constructive ideas, eminent good-fellowship and outstanding contribution to the establishment of the institute's important position in the coal industry."

New members of the executive board were chosen as follows: D. W. Buchanan Jr., Old Ben Coal Corp.; C. C. Conway, Consolidated Coal Co.; Clayton G. Ball, Paul Weir Co.; A. G. Gossard, Union Colliery Co.; H. A. Reid, United Electric Coal Cos.; and G. Don Sullivan, Fairview Collieries Corp.

Honorary memberships were awarded to Mr. Schonthal; John E. Jones, safety director, Old Ben Coal Corp.; Fred S. Pfahler, president, Superior Coal Co., Chicago; and Paul Weir, Paul Weir Co., Chicago.

Mr. Pfahler led the list as the oldest living of the past presidents honored at the annual banquet. Others present for the ceremony were Mrs. Jones, Geo. C. McFadden, Paul Weir Co., who presented the special memorial to Mr. Schonthal; H. A. Treadwell, Chicago, Wilmington & Franklin Coal Co.; W. J. Jenkins, Consolidated Coal Co.; H. H. Taylor Jr., Franklin County Coal Corp., Inc.; Mr. Weir; Carl T. Hayden, Sahara Coal Co.; J. A. Jefferis, Illinois Terminal R. R.; B. H. Schull, Schull-Moake Coal Corp.; R. M. Medill; Dr. M. M.



NEW HONORARY MEMBERS—B. E. Schonthal (left), also honored for services to the institute as secretary-treasurer; F. S. Pfahler, president, Superior Coal Co., and oldest living ex-president of the institute; Paul Weir, Paul Weir Co.; and John E. Jones, safety director, Old Ben Coal Corp.



**MINERS OF THE FUTURE**—62 University of Illinois mining students (foreground), who as guests of the institute heard Mr. Woods stress the need for more trained men in coal mining in his banquet talk, "Future Leaders of the Coal-Mining Industry."

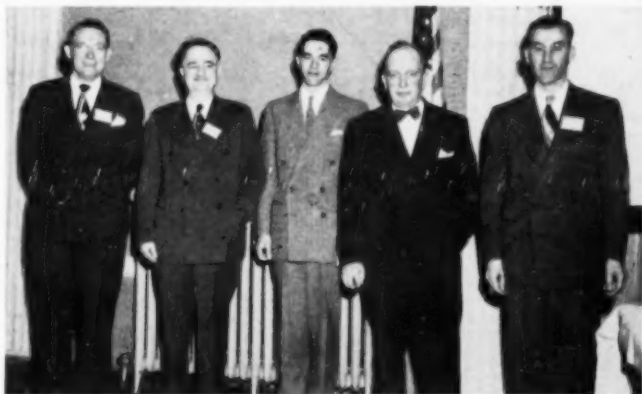
Leighton, Illinois Geological Survey; and R. L. Adams, Old Ben Coal Corp. Helen Brail, secretary to Mr. Schonthal and lieutenant in charge of meeting arrangements, was honored with a special gift and formal presentation to the Institute members.

Speaking honors at the banquet were shared by Edward A. McPaul, "So You Think You're Slipping," and Henry C. Woods, chairman of the board, Sahara Coal Co., Chicago, "Future Leaders of the Coal-Mining Industry." Addressing himself in part to 62 University of Illinois mining students, who were special guests of the institute, Mr. Woods stressed the need for more trained men in coal mining and urged the importance of more operator participation in programs designed to help young men get training and a start in the industry.

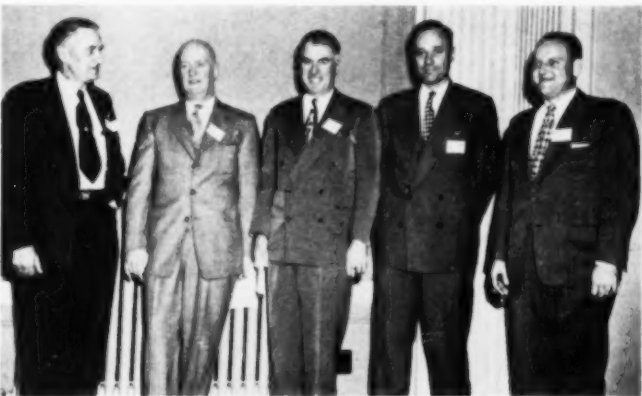
"Sitting here tonight," said Mr. Woods, "are young men filled with ambition and hope. They have chosen coal mining as a vocation. They see ahead good positions as coal-mining engineers, and bright futures in which jobs as superintendents, managers and even higher executive places are possibilities. The industry is deeply indebted to these young men for having chosen coal as a career and we will not let them down. However, to avoid letting them down more of you who are in position to give them their first chance must come forward and cooperate with the educational program. . . .

"It is indeed gratifying to have you mining engineering students here to meet your future employers. And when I say that I hope you executives will note that I am calling you the future employers of these bright young men and others like them. Along that line let me make a few suggestions as to what you men who run the mines can do, you engineers, superintendents, operating men, managers—yes, and you suppliers, too.

(Continued on p 182)

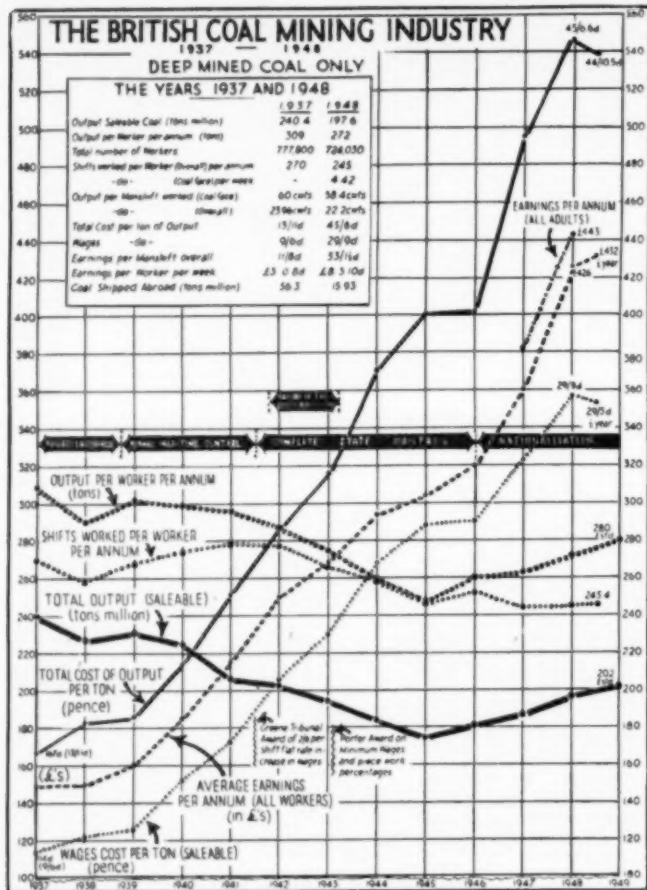


**MINING, TRANSPORTATION AND ACCOUNTING**—A. Lee Barrett (left), Joy Mfg. Co.; J. W. Broadway, Bell & Zoller Coal & Mining Co.; Robert Fletcher, J. H. Fletcher Co.; A. B. Crichton Jr., Johnstown Coal & Coke Co.; and Clayton G. Ball, Paul Weir Co. (chairman).



**PREPARATION, POWER AND STRIPPING**—L. E. Briscoe (left), Ayrshire Collieries Corp.; H. R. Stoddard, Simplex Wire & Cable Co.; G. Don Sullivan, Fairview Collieries Corp. (chairman); J. J. Huey, United Electric Coal Cos.; and Robert N. Morris, Sahara Coal Co.

## Soaring Costs and Lagging Output Plague British



proved. Following sharp debate by the opposition, the government was sustained by a vote of 270 to 152.

Earlier, it had been announced that 4,253,200 tons of deep-mined coal had been produced during the week ending Nov. 5, the highest output reported since the week ending Dec. 18, 1948. With a strip output of 260,200 tons, total production for the week was 4,513,400 tons, also the best since last Dec. 18. Figures for the week ending Oct. 29 showed a total of 709,100 workers employed, a drop of only 400 from the previous week, as compared with a weekly decline of 1,000 workers for several weeks previously. Overall output per man-shift was 1.19 in that week and 1.20 the week before but voluntary absenteeism was 5.13% against 5.31% the previous week.

**AUSTRALIA**—Under the Coal Mines Amendment Bill recently introduced in the New Zealand legislature, the government is to be given the power to purchase slack and other coal of low commercial value and upgrade it into a usable fuel. Following study in Great Britain, Canada and the United States by a government expert, it reportedly has been decided to install an American-type briquetting plant, using 60 to 80% sub-bituminous coal, with the balance consisting of bituminous, except for binder. The first plant is being planned for South Island, where most of the sub-bituminous reserves are located and if results are satisfactory, others will be built in various parts of the dominion.

**ITALY**—Seeking to increase Sardinian coal output to 2,000,000 tons annually, Azienda Carboni Italiani reportedly is planning to purchase mining equipment in the United States for the new coal field discovered in the Sulcis area. Representatives were scheduled to sail for the United States during November. About 2 billion lire is to be available for the purchases.

**GREECE**—Raymond G. Travis, engineer with the U. S. Bureau of Mines, is to spend six months in Greece supervising diamond-core drilling of lignite beds at Aliveri and Mimi. The work is part of a program to develop lignite as a fuel for thermal power generation and is being financed under the Marshall Plan.

**INDIA**—Government of India representatives administering the occupied state of Hyderabad have seized from private interests the large Singareni collieries and have announced plans for increasing its output. Mechanical equipment is to be introduced to increase production from the previous 1,000,000 to 1,500,000 metric tons annually within the next few years. The previous state government reportedly had a financial interest in the collieries but did not control the management.

## Foreign Developments



**GREAT BRITAIN**—The House of Commons Nov. 10 had its first debate on the nationalized coal industry since the government took over the mines. Harassed by difficult mining conditions, lack of manpower, insufficient modern machinery, and absenteeism, Britain's mines under nationalization have experienced sharp increases in wages and over-all costs, without cor-

responding increases in output per worker or total output necessary to supply the country's domestic and export needs (see chart above).

During the debate, the government's spokesman maintained that the National Coal Board had overcome its teething troubles and was making progress, that output and exports were continuing to rise and that productivity was increasing steadily. Costs have been held and are tending to fall and the financial position has been greatly improved, he said. At the same time, he expressed the government's continuing concern over absenteeism and the manpower situation. Lack of incentives or the theory that the miner has nothing to buy were not the causes of absenteeism, he maintained, but rather that the miner valued his leisure over the things he could buy and he suggested that the situation would not be solved until housing conditions were im-

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## Black Star, Inland Steel Kentucky Safety Champs

The team from the Black Star Coal Co., Alva, Ky., took top honors in the mine-rescue contest, and teams from the Inland Steel Co., Wheelwright, Ky., made a clean sweep of the four first-aid competitions to become state champions in their respective divisions at the Kentucky State-Wide Mine Rescue and First Aid Contest held at Middlesboro, Ky., Oct. 21-22. Teams participating in the meet were champions of their respective districts as a result of previous competitions.

In the mine-rescue contest held Oct. 21, with four teams entered, team standings and captains were: First, Black Star Coal Corp., Alva, Ky.; Earl Lane; second, Consolidation Coal Co. (Ky.), Jenkins, Raymond Wetzel; third, Mine No. 7, Eastern Coal Corp., Stone, Roy Alexander; and fourth, Consolidation Coal Co. (Ky.), Clossplint, Oscar Brook.

Fourteen competitive teams and one demonstration team participated in the white-division first-aid contest Oct. 22, the first four finishing in this order: Inland Steel Co., Wheelwright, Roy Conley, captain; Consolidation Coal Co. (Ky.), Jenkins, Blaine Sexton; Blue Diamond Coal Co., Ridge, Tenn., Arthur Combs; and Consolidation Coal Co. (Ky.), McRoberts, Warnie Flint.

In the colored first-aid competition, the five teams entered scored in the following order: Inland Steel Co., Wheelwright, J. T. Miller, captain; Leckie Collieries Co., Affex, James Miles; Old King Mining Co., Tribbey, Jack Cannon; Perkins-Harlan Coal Co., Liggett, Rance Wilson; and Blue Diamond Coal Co., Fork Ridge, Tenn., George Langham.

The first aid contests for boys and girls each had two teams sponsored by mining companies. In the girls division, the Inland Steel team, captained by Ann Parker, placed first over that from the Blue Diamond Coal Co., Chevrolet, captained by Darline Wells. The boys team from Inland Steel, captained by Don Begley, took top honors over the team from the Old King Mining Co., Tribbey, captained by Billy Mosley.

## Strip Mine Safety Records

Unusual safety achievements of two Illinois strip mines have been added to those previously reported to the safety division of the National Coal Association. The Little John mine, Little John Coal Co., Victoria, Ill., reportedly mined 7,552,113 tons from December, 1936, through September, 1949, without a fatality. A broken arm was the most serious injury suffered during the period. The Midwest mine of the Midwest Radiant Corp. operated from February, 1939, through August, 1949, without a fatality and mined over 6,000,000 tons.

## Bureau Reports Progress On Coking-Coal Survey

Entering its second year, a nationwide survey of minable coking coals by the Bureau of Mines has made marked progress in four eastern states in the heart of the nation's most productive coal region, Director James Boyd reported recently.

The survey, which eventually will cover all the nation's coking-coal-producing states, got under way in Indiana County, Pennsylvania, in August, 1948. When completed, it will serve as a guide in developing adequate reserves for use in time of national emergency.

With five teams in the field, the bureau is now determining minable reserves of coking coals in nine counties in central and western Pennsylvania, nine counties in West Virginia, nine counties in eastern Kentucky, and a few counties across the border in Virginia. Work in these states will continue during 1950, eventually extending to all counties where coking coals are being mined.

## National Coal Reports Committee Appointments

Personnel comprising several of the association's active committees recently was announced by R. H. Knode, president, National Coal Association, as follows:

Safety Committee: chairman, L. C. Campbell, vice president, Coal Division, Eastern Gas & Fuel Associates; Birch Brooks, manager of operations, Walter Bledsoe & Co.; James Casano, operations assistant, Utah Fuel Co.; D. H. Devonald, vice president, Peabody Coal Co.; David L. Francis, president, Princess Elkhorn Coal Co.; P. C. Graney, president, Gulf Mining Co.; George R. Higinbotham, vice president-operations, Consolidation Coal Co. (W. Va.); Harry LaViers, vice president, South-East Coal Co.; Ralph H. Moore, vice president, Rich Hill Coal Mining Co.; O. B. Pryor, vice president in charge of operations, The Valley Camp Coal Co.; and George H. Rupp, manager, Mining Department, Colorado Fuel & Iron Corp.

Committee on Natural Resources: chairman, H. B. Baird, vice president, Coal Division, Eastern Gas & Fuel Associates; Rolla D. Campbell, general counsel, Island Creek Coal Co.; A. B. Crichton, president, Johnstown Coal & Coke Co.; George H. Love, president, Pittsburgh Consolidation Coal Co.; George A. Miller, vice president, Peabody Coal Co.; W. H. Naylor, vice president, Davis Coal & Coke Co.; Charles J. Potter, president, Rochester & Pittsburgh Coal Co.; and K. A. Spencer, president, Pittsburg & Midway Coal Mining Co.

Interstate and Foreign Commerce Committee: chairman, Laurence E.

Tierney, Jr., president, Eastern Coal Corp.; Walter F. Clarke, vice president and general manager, Independent Coal & Coke Co.; H. Vernon Fritchman, vice president, Rochester & Pittsburgh Coal Co.; P. E. Ebert, general sales manager, Sunday Creek Coal Co.; T. J. Hoffman, vice president, West Kentucky Coal Co.; A. A. Logan, vice president, Peale, Peacock & Kerr, Inc.; W. F. Schulten, assistant to the vice president, Pittsburgh Consolidation Coal Co.; R. D. Stockdale, president, Red Jacket Coal Sales Co.; G. Don Sullivan, assistant to the president, Ayrshire Collieries Corp.; and A. W. Vogtle, vice president, DeBardeleben Coal Corp.

## Big Sandy-Elkhorn Group Holds Annual Safety Day

Teams from Consolidation Coal Co. (Ky.) and the Inland Steel Co., between them, captured top places in the mine-rescue and three first-aid competitions at the Annual Safety Day of the Big Sandy-Elkhorn Coal Mining Institute, held Oct. 14-15 at Pikeville, Ky. In all, 23 teams participated and a total of \$1,615 was awarded in team prizes. Prizes presented as a result of ticket drawings included an automobile, deep freeze and bicycle.

Team winners in the several classifications, and their captains, were: mine rescue, Mine 204-207, Consolidation Coal Co. (Ky.), Jenkins, Raymond Wetzel; white first aid, Mine No. 214, Consolidation Coal Co. (Ky.), McRoberts, Warnie Flint; colored first aid, Inland Steel Co., Wheelwright, J. T. Miller; boys first aid, Inland Steel Co., Wheelwright, Don Begley. In the girls first aid division, the team from Inland Steel Co., Wheelwright, captained by Ann Parker, was the only participant.

## Anthracite Institute Opens Smoke Clinic

A smoke Prevention Clinic to aid New Yorkers, and particularly owners of large buildings, has been established at Anthracite Institute headquarters, 101 Park Ave., Frank W. Earnest Jr., president, announced late in October. The opening of the clinic was attended by the director of the New York City Smoke Control Bureau, William H. Byrne, who praised its objectives.

The Smoke Prevention Clinic is staffed by 10 qualified engineers experienced in smoke prevention and especially in advising building management and municipal authorities. The clinic's engineers, equipment and informational material, including lists of commercial consulting engineers and equipment manufacturers, are available without cost to New York building owners and managers.





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FLOTATION AND CONTROL—Seated, Orville R. Lyons, C. A. Reed, R. A. Mullins, J. J. Merle; standing, T. S. Spicer, R. E. Zimmerman.



LARRY A. SHIPMAN responds after receiving the Percy Nicholls award presented by Julian E. Tobey (right).

## Preparation Coal—Division Theme

**Joint AIME-ASME-Indiana Meet Featured by Discussion of Coal Drying, Froth Flotation and Preparation Control, With Nuclear Power-Plant Design and Inspection Trips Supplementing Sessions on Fuel Burning**

COAL DRYING, froth flotation of coarse-coal particles and laboratory control in coal washing and drying plants were subjects of prime interest to coal producers at the 12th joint meeting of the Coal Division, American Institute of Mining & Metallurgical Engineers and the Fuels Division, American Society of Mechanical Engineers, held at the French Lick Springs Hotel, French Lick, Ind., Oct. 26-27. In lieu of its annual coal conference, the Indiana Coal Preparation & Utilization Society joined in the French Lick meeting.

Larry A. Shipman, fuel engineer, Southern Coal & Coke Co., Knoxville, Tenn., was given the Percy Nicholls award for outstanding achievement in the field of solid fuels. This was presented by Julian E. Tobey, president, Appalachian Coals, Inc., Cincinnati, at a dinner presided over by M. M. Leighton, chief, Illinois Geological Survey, Philip Wilkie, member, Indiana General Assembly, spoke on economic conditions in England, having recently returned from a trip to that country.

Design problems of nuclear power plants were discussed by Ward F. Davidson, research engineer, Consolidated Edison Co., New York, at a luncheon. E. R. Price, general superintendent, Inland Steel Co., Wheelwright, Ky., retiring chairman of the Coal Division, opened the French Lick

meeting. Carroll F. Hardy, chief engineer, Appalachian Coals, Inc., chairman-elect of the division, was introduced.

Chairman and vice chairman at the session including froth flotation and laboratory controls were C. A. Reed, chief engineer, National Coal Association, and Orville R. Lyons, coal-preparation research engineer, Battelle Memorial Institute. One session, with W. L. McMorris Jr., preparation and research engineer, H. C. Frick Coke Co., as chairman, and R. G. Baughman, superintendent of preparation and construction, Central Indiana Coal Co., as vice chairman, was devoted to coal drying.

An inspection trip was made to the new Maid Marian preparation plant of the Central Indiana Coal Co. near Linton, Ind. R. E. Sherwood, president; S. F. Sherwood, assistant to the president; Homer Miller, tipple foreman; and Mr. Baughman conducted the parties through the plant. The outstanding attraction was four Baughman Verti-Vane heat dryers which dry the 1½x10-mesh washed product (*Coal Age*, April, 1949).

Flash dryers have been found quite satisfactory for drying minus-¼-in coal from the Freeport seams and they cause no change in chemical characteristics, volatile content or coking characteristics, said E. P. Calhoun, assistant production manager,

Rochester & Pittsburgh Coal Co., Indiana, Pa., in a paper on "Moisture Control with Flash Dryers." He reported that plants of the R. & P. company equipped with flash dryers turn out a slack coal that is more uniform and on the average lower in moisture than before cleaning and drying equipment was installed (*Coal Age*, October, 1949). Operating details and the advantages and disadvantages of the dryer were outlined. In slack containing a high percentage of fines, control of the dust nuisance is the biggest problem.

Answering questions, Mr. Calhoun said that variations in feed and in moisture in the feed cause little or no difficulty when the coal goes to several drying units. However, if the installation has only one unit a fairly large surge bin is needed.

At the R. & P. plant experiments are being made with synthetic-fiber bags for dust collecting at the high temperatures. The dryers have insulating jackets and the over-all thermal efficiency, furnace and dryer, is about 58%. A dryer with a 30-in column has been operated at 75 tph and it is thought that a capacity of 90 tph could be achieved in a larger column. Slack coal with 2% surface moisture will pick up practically no water in shipment, even if rained on, and will arrive at destination so dusty that customers would not want as low a moisture the second time. Twenty cents per ton should cover the entire drying cost of a feed containing 11% surface moisture.

Mr. Lyons, in a paper on "Operating Data for a Verti-Vane Thermal Coal Dryer," based his data on an experimental unit installed at Allendale mine and on a battery of four perfected units at Maid Marian mine,



DEWATERING AND DRYING—John L. Erisman (left), R. G. Baughman, R. H. Swallow, E. R. Price, W. L. McMorris Jr., E. P. Calhoun, and Orville R. Lyons

both Central Indiana properties. He reported that the Maid Marian installation had proved fully successful and that no maintenance had been required since operation started in March 1948. A minor design change was made, however, consisting of heavier flights in the dried-coal conveyor. Pertinent data on the Maid Marian installation, drying minus- $\frac{1}{4}$ -in plus 10-mesh coal, include the following: 10-12% surface moisture in feed, 2.48% in dried coal, 3.5 tons of water removed per hour per unit, 600 F inlet gas temperature, 115-deg outlet temperature, 6 min dryer-retention time.

Answering questions, Mr. Baughman said they have not been able to detect any degradation by the dryer. With  $1\frac{1}{4}$ x10-mesh, there is very little dust in the air discharge and in experiments,  $\frac{3}{8}$ x10-mesh size has been dried with good results.

John L. Erisman, Link-Belt Co., Chicago, in a paper on "Drying of Coal in Relation to Coal Preparation," dealt with fundamentals, including conduction, radiation and convection, and then described the Roto-Louvre dryer which Link-Belt introduced from England. He used slides in describing several installations, including one recovering a formerly wasted slurry sold to a large power station.

Replying to questions, Mr. Erisman said that total cost of drying depends largely on the water in the feed and might run between 8 and 40¢ per ton, including depreciation, maintenance, power and so on. The 8¢ figure would be for a maximum volume of coal to be dried containing a minimum of moisture. Mixing some dried coal back into the feed can solve any difficulty growing out of balling of wet fines. Mr. Shipman called attention to the great differences in coals from the standpoint of ability to absorb moisture. Further comment included a statement from the floor that a

heavy rain may wet the top 2 or 3 in of a car while the coal below that level will remain quite dry.

In "Some Factors Influencing Froth Flotation of Coarse-Coal Particles," a paper by Shiou-Chuan Sun and R. E. Zimmerman, Pennsylvania State College, and read by Mr. Zimmerman, assistant professor and division chief, Division of Minerals Preparation, it was concluded that the maximum size of bituminous-coal particles that can be floated efficiently in a laboratory Fagergren flotation machine is 3x6 mesh while for anthracite the top is 14x20 mesh. The experiments included study of the effects of aeration, agita-

tion, pulp turbulence, flotation reagents and mineral density.

Floating the larger particles increases the ash of the smaller sizes, said Mr. Zimmerman in answering a question. Other points brought out in the ensuing discussion were: Lots of froth is required to bring coarse particles to the top and the particles tend to hang at the interface between the froth and pulp and must be removed quickly or will drop back. While larger sizes can be floated, 10 mesh seems to be the practical top limit and 28 mesh the convenient top. There is a minimum particle size of anthracite that can be treated by froth flotation. Small particles oxidize readily and the oxidized surfaces will not attract bubbles. Froth flotation is practical for treatment of minus-28-mesh slurry for recovery of valuable material and for keeping fine coal out of streams.

Labor costs of less than 1¢ per ton of washed coal for control laboratories and 3 mills per ton for a central control laboratory were cited in a paper on "Laboratory Plant Control," by J. J. Merle, assistant production manager, and Richard A. Mullins, chief chemist, Aryshire Collieries Corp., Indianapolis. They have found that if the sales department or companies make full use of the information, a well-organized laboratory can pay for itself in many ways; for instance, by reducing operating costs and enabling the seller to place the coal for economic and satisfactory service.

Laboratory procedure at the Aryshire mines was described and the illustrations included daily data sheets filled out jointly by the technologist and plant foreman. Two men, a technologist and a technician, comprise the crew at each control laboratory. Four men staff the central laboratory. A substantial percentage of the Aryshire-group coal is sold on an analysis basis only.

Discussion indicated that some of the operators were surprised at the few men employed to handle the laboratory jobs. Raw coal is not sampled because of the large sample that would be required to be representative. Equipment to facilitate taking samples from cars includes special stairs. The coal company's own procedure rather than the standard ASTM procedure is followed. Also, a short procedure for ash determination is used. Two referees, one at the customer and one at the producer end, compromise or throw out one analysis when the analyses of the customer and producer differ widely.

Other papers presented at the meeting were: "Steam Generating Design Development as Influenced by Available Fuels and Fuel Quality," John Van Brunt; "Fuel Burning Equipment Development for Available Gas, Oil and Solid Fuels," R. K. Allen, Babcock & Wilcox Co., and "Use of Ignition Baffles with Single Retort Stokers," T. S. Spicer, R. J. Grace and C. C. Wright, Penn State College.

## EQUIPMENT APPROVALS

Six approvals of permissible equipment were issued by the U. S. Bureau of Mines in October, as follows:

Clarkson Mfg. Co.—Type 2488 loader; one motor, 50 hp, 220 v, ac; Approval 2-692; Oct. 6.

Joy Mfg. Co.—Type CD27 drilling machine; three motors, one 15 hp and two either 2 or 3 hp, 250 or 500 v, dc; Approvals 2-693 and 2-693A; Oct. 21.

Brown-Fayro Co.—Type HG car-spotting hoist; one motor, 5 hp, 220 or 440 v, ac; Approvals 2-694 and 2-694A; Oct. 21.

Lee-Norse Co.—Model RJL-2 utility truck; two motors, one  $7\frac{1}{2}$  hp and one 4 hp, 250 or 500 v, dc; Approvals 2-695 and 2-695A; Oct. 25.

Goodman Mfg. Co.—Type 120 Conway shovel; one motor, 25 hp, 230 v, dc; Approval 2-696; Oct. 27.

Goodman Mfg. Co.—Type 97-C-30 belt conveyor; one motor, 20 hp, 550 v, ac; Approval 2-697A; Oct. 31.



**AIEE COMMITTEE MEMBERS** at Cincinnati meeting—Standing, H. P. Musser (left), president, West Virginia Engineering Co.; L. H. Harrison, mining-electrical engineer, Coal Mines Inspection Division, U. S. Bureau of Mines, Birmingham; J. M. Downie, application engineer, transportation division, General Electric Co.; A. B. Chafetz, design engineer, International Minerals & Chemicals Corp.; L. W. Scott, engineer, General Electric Co., Charleston, W. Va.; and C. O. Wood, supervisor of control design, engineering department, Goodman Mfg. Co.; seated, E. G. Schlup (left), chief electrical engineer, general engineering department, Armco Steel Corp.; D. E. Renshaw, industry engineering department, Westinghouse Electric Corp.; T. B. Montgomery, control engineer, engineering department, Allis-Chalmers Mfg. Co.; A. C. Muir, electrical engineer, Berwind-White Coal Mining Co.; and J. J. Fitzgibbon, assistant manager, General Electric Co., Charleston.



**MORNING SESSION**—H. P. Musser (left), president, West Virginia Engineering Co.; L. W. Scott, General Electric Co., Charleston; J. A. Dunn, electrical superintendent, Island Creek Coal Co.; C. O. Wood (session chairman), supervisor of control design, Goodman Mfg. Co.; and W. R. Wood, Berwind-White Coal Mining Co.



**AFTERNOON SESSION**—W. R. Roberts (left), elec. engr., Jeffrey Mfg. Co.; J. W. Woolf, elec. development engr., Joy Mfg. Co.; A. C. Muir (session chairman), elec. engr., Berwind-White Coal Mining Co.; J. R. Doig, locomotive engr. dept., General Electric Co.; and W. P. Place, partner, Farmers Engineering & Mfg. Co.

## AIEE Studies Electrical Problems

**Efficient Rectifier Substation Size, Making Old Motors Explosion-Proof, Power Costs and Trends, Inspection Technique, Shuttle-Car Improvements and Belt-Conveyor Controls Studied at Cincinnati Meeting**

**OPTIMUM** rectifier-substation size for the average coal mine of today is 300 kw, concluded J. A. Dunn, electrical superintendent, Island Creek

Coal Co., Holden, W. Va., and L. W. Scott, local engineer, General Electric Co., Charleston, in a joint paper presented at the fall meeting of the

American Institute of Electrical Engineers, Cincinnati, Oct. 17-21. All eight papers of the two sessions devoted to the mining and metal industries had a direct bearing on coal-mining electrical problems.

Other subjects discussed were: explosion-proof motors; power use, costs and trends; inspection technique; shuttle cars; belt-conveyor controls; locomotive cable reels and trolleyphone communication. A. C. Muir, electrical engineer, Berwind-White Coal Mining Co., Philadelphia,

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## Coal and Business Activity

Est. anthracite prod., week ending Nov. 12.....	1,263,000	1949 to This Date 37,455,000	1949 Over 1948, to Date —25.0%
Est. bituminous prod., week ending Nov. 12.....	7,100,000	358,838,000	—30.6%

Source: U. S. Bureau of Mines.

	Bituminous Coal Stocks			Consumption		
	(Thousands, net tons)			(Thousands, net tons)		
	Oct. 1, 1949	Days' Supply	Sept. 1, 1949	Oct. 1, 1948	Sept., 1949	Aug., 1948
Electric power utilities.....	24,142	114	25,458	22,751	6,341	6,732
By-product coke ovens.....	11,800	49	13,804	10,968	7,191	7,384
Beehive coke ovens.....	1	1	1	1	47	79
Steel and rolling mills.....	1,029	59	1,152	1,152	527	551
Cement mills.....	1,422	68	1,454	1,369	625	641
Other Industrials.....	14,814	56	15,912	19,619	7,882	7,485
Railroads (Class I).....	6,680	43	8,196	8,815	4,709	5,133
Retail dealers.....	2,074	7	2,845	2,918	9,245	5,586
Total.....	61,961	51	68,621	67,592	36,567	33,567

Source: U. S. Bureau of Mines. †Not available. ‡Retail dealer deliveries.

	Latest Week*	Month Ago	Year Ago
Business Week Index of Business Activity, wk. ending Nov. 12	161.3	161.1	197.4
Steel ingot operations (% of capacity).....	54.0	9.3	99.0
Electric power output (million kw-hr).....	5,435	5,481	5,571
Crude oil & cond. prod. (daily avg., 1,000 bbl.).....	5,185	5,044	5,675
Misc. and L.C.L. carloadings (daily avg., 1,000 cars).....	67	67	90
All other carloadings (daily avg., 1,000 cars).....	29	29	64
Prices, spot commodity index (Moody's, Dec. 31, 1931 = 100).....	344.0	336.1	398.8
Prices, industrial raw materials (B.L.S., Aug., 1939 = 100).....	228.0	224.1	279.7
Prices, domestic farm products (B.L.S., Aug., 1939 = 100).....	290.2	292.5	317.6
Prices, finished steel composite (Iron Age, lb).....	3.705c	3.705c	3.720c
90 stocks, price index (Standard & Poor's Corp.).....	126.9	126.1	120.6

\*Date of latest week for each series on request.

and vice chairman of the Committee on Mining and Metal Industry, was chairman of one of the sessions. C. O. Wood, supervisor of control design, engineering department, Goodman Mfg. Co., was chairman of the other session. The committee, with at least 12 men of coal-industry connections present, also held a planning meeting at which T. B. Montgomery, control engineer, electrical department, Allis-Chalmers Mfg. Co., Milwaukee, and chairman of the committee, presided.

The paper by Messrs. Scott and Dunn, which was read by Mr. Scott, arrived at the conclusion that 300 kw is the optimum size of rectifier for average mining use by a general study of present-day loads, the factors involved, a few case histories and a number of graphs, each of which included curves for four assumed 275-v loads of 728, 1,000, 1,456 and 1,820 amp.

The assumptions include 20% voltage drop at peak loads, a 35% load factor and a power cost of 2c per kw-hr. A "standard" coal-mining conductor was defined as a No. 9-section trolley wire in parallel with a 1,000,000-cir. mil feeder cable. In discussion, Mr. Scott noted that automatic-drop voltage equipment now is available for rectifiers to solve the problem of overloading by a large locomotive passing close to a substation operating in parallel with one or more other substations.

Opinions that 400-kw rectifiers would have been preferable in at least one of the case studies and that above 300 kw a rectifier calls for use of tubes larger than those now being manufactured constituted the gist of

a written discussion by Walter E. Gutzwiller, sales engineer, Allis-Chalmers, read by I. K. Dortort, engineer, rectifier division of that company. D. E. Renshaw, industry engineering department, Westinghouse, approved the 300-kw optimum size but disagreed with the method used to arrive at it. He predicted that in the next 10 years the coal industry would be using at least 30% more power than now.

How the Berwind-White Coal Mining Co. rebuilt old 5-hp motors into explosion-proof units when permissible motors were not available because of slow deliveries was described by W. R. Wood. Requirements of the state department of mines were met and coal production was maintained by rebuilding.

Power cost per ton of coal produced remained constant from 1923 to 1942, when an upward trend started that has continued to the present, according to one of the several graphs which H. P. Musser, president, West Virginia Engineering Co., Charleston, presented with his paper analyzing power costs of bituminous coal mines. The long period of stability followed by the upward trend, holds true for all six classes of mines studied, ranging from zero to 5,000 tons per month up to over 60,000 tons per month. From 1923 to 1942, kilowatt-hours per ton increased but the power cost per kilowatt-hour decreased.

Mr. Musser presented a power data sheet summarizing studies of more than 400 representative bituminous mines in the Appalachian area over a 16-year period. In 1948, the average kilowatt-hour consumption per ton for

the various classes of mines from small to large was: 6.16; 5.65; 5.33; 5.22; 5.11; and 5.30. Power costs in cents per ton, in the same order, were: 14.27; 11.14; 9.50; 8.53; 7.87; and 7.47.

An electrical winding should last 40 years if the machine is properly inspected and maintained, said W. W. Mattson, in charge of electrical inspection of prime movers for the Armco Steel Corp., in his paper, "Electrical Machinery Inspection Technique and Problems." Megger readings are included in the inspection routine for a machine but are made last because many other points outrank insulation resistance in importance. Dryness and brittleness of insulation is not in itself a condition calling for renewal of a winding.

Mr. Mattson does not like the idea of considering carbon brushes expendable and believes that brushes can be developed for a machine of good design that should last "almost indefinitely." Inspections are made on the premise that a machine fails by failure of some individual part, he pointed out. He outlined the examining procedure from foundation to bearings, including lubrication and electrical factors, and said that operation under load should be observed and operating temperatures recorded and compared to load conditions. The inspector should be a trained workman and a competent engineer, he emphasized.

Mr. Muir called attention to the relatively short life of carbon brushes on some types of mining machinery and said he would like to know how long is "almost indefinitely" for that type of service. No one came up with an answer to that riddle.

Series-parallel control, non-spin differentials, hydraulically-operated disk & brakes and the displacement-type mercury timing switches are among the recent improvements on shuttle cars, said James W. Woolf, electrical development engineer, Joy Mfg. Co. His paper, "Shuttle Cars and Electrical Problems Encountered in Their Use," described the present-day shuttle car, outlined the inspection and maintenance and discussed the problems of the cable reels and low voltage. Shuttle cars have been operated over distances up to 5,000 ft by using a double trolley system of power feed, he reported. The present size range is 3 to 14 tons.

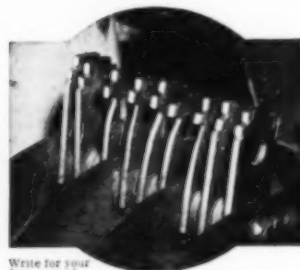
Because of the heavy intermittent loading and other severe operating conditions, regular and thorough inspections followed by repairs of a permanent nature are necessary to hold costly delays to a minimum. Some maintenance points Mr. Woolf stressed were: (1) examination for loose connections, contactors cleaned and replaced in time, insulation cleaned and painted and spare electrical parts kept close by to prevent make-shift repair; (2) testing the control circuit by blocking out the line contactor and then observing operation of the other contactors when the foot switch and master station are

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operated; (3) using an ohmmeter across the trailing cable to check the power circuit of a resistor-type starter by closing the contactors manually; and (4) combating nitrous acid in explosion-proof enclosures by cleaning, by placing dried bags of silica gel in the enclosures and by keeping the labyrinth fittings of the enclosure ventilating system clean.

The hydraulic motor drive for a cable reel causes much less trouble than the older electric drive but still is not perfect since when adjusted for proper tension at full reel it provides three times the required tension at empty reel, Mr. Woolf declared. Torque is reduced for unspooling by an unloading valve actuated by reversal of the reel. Cable heating can be reduced by unwinding the unused portion from the reel and laying it along the rib. A coil-spring cable anchorage reduces damage from jerks. Use of push-pull-type connectors at the reel will facilitate replacing entire cables, thus permitting a damaged cable to be taken to the shop for splicing and vulcanizing, he said.

Use of disk brakes, which are sturdy and dependable, has greatly reduced electrical maintenance by minimizing plugging. Mr. Woolf pointed out. Low voltage causes inefficient performance and excessive maintenance of shuttle cars. Magnetic controllers of 250-v cars require 170 v at the controller, which means 10 to 20% higher at the nips. Repeated requests from users have persuaded some manufacturers to supply coils that will operate controllers on as low as 130 v, he reported. While they do not recommend such operation, they recognize that in certain special cases it has proved economical.

In discussion, A. B. Chafetz, design engineer, International Minerals & Chemical Corp., Carlsbad, N. M., told of using 10½-ton shuttle cars with dual trolley power for hauls up to 5,000 ft in underground phosphate mining. The cars are equipped with dynamic braking and airplane-type disk brakes. Downhill speeds as high as 15 mph required redesign of the armature banding.

W. F. Roberts, electrical engineer, Jeffrey Mfg. Co., in a paper, "Electrical Control of Belt Conveyors," dealt with the problems and solutions of the following: (1) interlocked sequence control, (2) belt protective devices, (3) two-speed belt operation and (4) surge or belt spillage protection. He discussed two methods of obtaining interlocked sequence control: (a) by stringing a single-conductor cable and (b) by using a rotary switch (also called plugging or centrifugal switch). The second is gaining favor because it requires no extra interlocks in the controllers and is approved by the U. S. Bureau of Mines, reported Mr. Roberts, who used slides to show wiring diagrams of control methods.

Plastic-covered wire ropes strung as pull cords along the belt and connected to lever switches at 600-ft in-

tervals constitute satisfactory emergency belt stops, Mr. Roberts said. One pull stops the conveyor, while two pulls are required to restart it. Rotary switches can be used in a simple arrangement to cut power off belts in case of drive-pulley slippage or a stoppage of the belt for any reason.

Two-speed operation can be obtained by any of four methods: (1) inserting a resistor in the armature circuit of the motor, (2) using a two-speed gear transmission, (3) using a variable speed shunt-wound motor and (4) use of a two-speed motor. Approximate extra cost of obtaining two speeds by the first method is \$100; by the second, \$850; by the fourth, \$1,200. The two-speed gear transmission (2) is satisfactory for switching to low speed for carrying men and materials but is not suitable for the quick changes of speed required in shuttle-car operation. Application of the resistor method (1) likewise is limited to reducing speed for handling men and materials. The variable-speed shunt motor (3) is reasonable in cost and takes care of any condition. Mr. Roberts cited the rotary switch as a satisfactory means of providing surge protection for a belt.

Discussing the paper, C. O. Wood, Goodman Mfg. Co., described the use of paddles contacting the flowing coal to actuate mercury switches (*Coal Age*, July, 1948); springs and switches under rollers; mechanical and electric-eye methods of switching a belt automatically into high speed by the time a shuttle car begins dumping; and effecting reversed sequence of stopping to prevent spillage at belt-discharge points. Further discussion included mention of a Pennsylvania company that uses 10-v bare control wires strung along the belt line and approval of the Bureau of Mines of a new heavily insulated wire for the higher-voltage control lines that can be strung along the belt line without a hose protector.

Only about 25 kw-hr are required to operate a modern gearless electric cable reel throughout a locomotive shift, said J. R. Doig, locomotive engineering division, General Electric Co., Erie, Pa., in a paper tracing development of the cable reel from its beginning with the first application at the Glen Alden Coal Co. in 1902. The torque motor and series resistor were first applied in 1908 at a Delaware & Hudson mine. Gearless-type appeared in 1930. A pull of 35 lb is considered satisfactory for single-conductor cable and 45 lb for a two-conductor. To make a flat cable spool properly on a vertical-shaft reel, the guide must be above center and spaced some distance, perhaps up to 10 ft from the reel, thus permitting the cable flop necessary to prevent piling collapsing and tangling. E. J. Gleim, electrical engineer, Bureau of Mines, reported that granting approval to cable-reel locomotives is again under consideration and comments have been invited.

Trolleyphone mine communication

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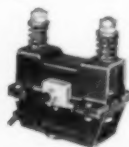
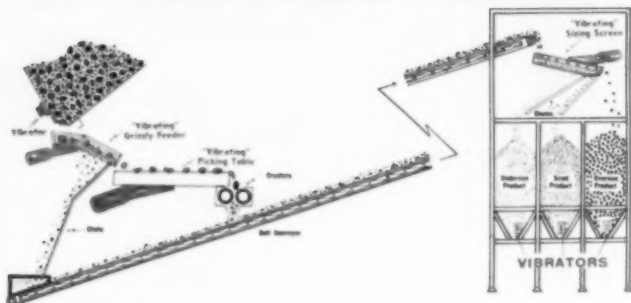
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that provide coarse sizing operation — bypassing fines — and controlling flow of coal to—



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was the subject of a slide-illustrated paper by W. P. Place, partner, Farmer Engineering & Mfg. Co., Pittsburgh. Frequency modulation (FM) is what really made trolleyphone communication practicable. Troublesome noises from sand on rails, burning trolley shoes, commutator sparking and higher harmonics from rectifiers are handled much better than was possible with amplitude-modulation (AM) sets, he reported. FM permits use of a good squelch circuit and automatically provides the same volume from the loud speaker whether the signal is coming from a nearby microphone or from one at considerable distance.

Attaining sturdy construction for underground mine duty was a considerable problem. Cases are  $\frac{3}{8}$ -in steel, sets are mounted on rubber and extra varnish is used to moisture-proof the coils. The wide variation in mine voltage had to be overcome. A frequency of approximately 100 kilocycles has proved the best, he said. In answer to a question, Mr. Place stated that 7 or 8 mi appears to be the ordinary limit of trolleyphone transmission underground although an installation with a range of 23 mi is working on the surface. Each mine presents a separate problem, which can be met only by trial. Repeaters are used in many mines and condensers often are installed to carry the signal around sectionalizing switches that may be open.

### National Safety Council

(Continued from p 147)

in some places for as long as six months, he added, pointing out that 48-in bolts are driven in at a 45-deg angle and that 38-in bolts are used vertically at the face. The old concept of vertical pressures to the bedding plane is outmoded, horizontal pressures being the critical factor, he explained. The cost of conventional timbering on a heading was about \$26 per foot but roof bolting can be done at half that cost, he said.

One mine recently had used 3-in wooden rods 5 ft long instead of steel rods and has had good success even though the roof is extremely bad, reported L. W. Kelly, U. S. Bureau of Mines, Vincennes, Ind. Using a track-mounted electric drill with a 3-in auger, operated by one man, this company now has roof-bolted 1,400 ft of entry with wooden pins, with costs totaling only 25% of what they would be with steel bolts.

Suggesting the possibility of using plastic or cement to bind bolts into the roof, Mr. Forester declared that roof bolting, though not a cure-all, is a forward step in safety and deserves further study and development, especially in the matter of improved tools and equipment.

In bituminous and lignite mines, workers on a full shift should not be





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- AND ROOF BOLTING BITS
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In every application over several years, Firthite Coal Cutter and Drill Bits have proved equal or superior to any bit on the market. Constant research and development at the mill plus the diligence of Firth Sterling mining engineers working side by side with operators in the mines, putting results of practical experience into actual improvements, assure carbide bit design and quality that means better, faster, cheaper coal cutting.



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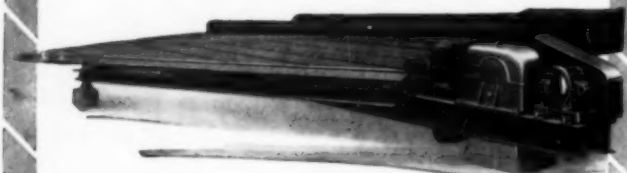
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R-178

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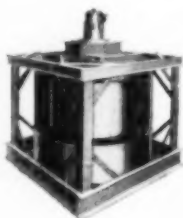


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exposed to dust concentrations exceeding 20,000,000 per cubic foot of air, maximum concentration for shorter periods should not exceed 40,000,000 and, if silica is present, silica particles should not exceed 5,000,000 warned John P. Harmon, Health & Safety Branch, U. S. Bureau of Mines, Pittsburgh, Pa.

Since dust is hard to control after it has become airborne and since ventilating air, though it carries dust away from the working face, spreads it to other working areas, it is important to keep dust from becoming airborne. Water, sometimes supplemented by a wetting agent, is the most effective way to control dust, Mr. Harmon said. A simple test to determine when enough water has been added is to compress a ball of bugdust in the hand. If, when released, the ball just falls apart without visible excess moisture, the water is adequate. If a wetting agent is used, the increase in weight of coal to which water has been added should be less than 1%.

Dry drilling should not be permitted, Mr. Harmon declared, citing dust samplings showing 1,200,000 particles per cubic foot with wet drilling and 662,000,000 with dry drilling. Water taken through the cutter-bar and applied by jets at the end of the bar seems most satisfactory, especially with the universal cutting machine. Plugging of the pipe usually can be prevented by maintaining pressure at 100 psi and making sure that water flows throughout the cutting cycle.

In loading, two wide-angle water sprays on the gathering head are desirable to wet the coal before it reaches the machine conveyor, Mr. Harmon stated. When a fall of face occurs during loading, two methods may be used: (1) a solid-cone wide-angle spray installed on the machine in such a way as to wet the face—a method which Mr. Harmon said he has not seen; and (2) "water infusion," which is accomplished by drilling holes into the face and applying water under pressure, thus penetrating the coal fractures with water and wetting the residual dust.

To reduce dust at the discharge end of a conveyor, water is best applied as far as possible from the discharge point, Mr. Harmon declared. Also, it is beneficial to wet wall, roof and floor before cutting, drilling, shooting and loading. This is especially important before shooting to subdue residual dust which might become airborne during concussion.

In discussion following the panel on roof-bolting and Mr. Harmon's paper, C. Fremont Davis, safety director, UMWA, Washington, D. C., asked what methods are being used to control dust produced by drilling roof-bolt holes. Mr. Harmon replied that methods other than water-spraying and wet drilling are being investigated and urged that drillers wear carefully fitted respirators. Mr. Forster commented that all operators

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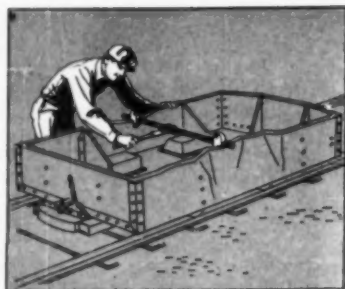
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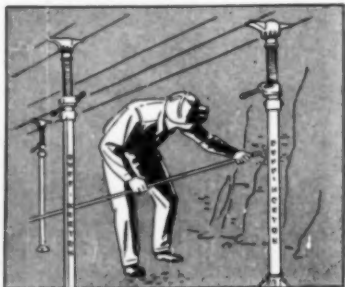


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using roof bolts are aware of the dust problem and are seeking ways to solve it. G. H. Sambrook, safety director, H. C. Frick Coke Co., Pittsburgh, Pa., asked how auger and percussion drills compare in dust generation. Mr. Harmon answered that dust concentrations are high in auger drilling as well as percussion drilling. Mr. Gray reported that roof-bolt drilling at T.C.I. operations is 100% wet drilling.

Mining under wet conditions with steel equipment, steel chutes, air lines, water lines and rails produces dangerous electrical conditions, reported W. E. Connor, mechanical superintendent, Lehigh Navigation Coal Co., Lansford, Pa., who discussed stray electrical currents and their control at his company's mines. Stray voltage is directly proportional to the load, originates with the power supply and ordinarily is not attributable to galvanic action, he said. These currents cannot be eliminated but they can be detected and controlled with proper care and equipment.

To detect and control stray currents, one inspector is kept on duty all day, making tests of trolley, rail and equipment voltages and stray voltages, with a high-resistance voltmeter. Since air and water lines will carry some current anyhow, it is good sense to use them for return circuits. To accomplish this, Mr. Connor explained, rails are bonded to air and water lines, sometimes by welding but most often by a specially manufactured bonding installed on heavy-metal areas of pipes. In addition, all ac equipment has a continuous metallic ground to the source of power, rails are crossbonded every 200 ft and regular tests are made to locate trouble spots. Since tests have shown that voltages as low as 0.48 to 0.85 will detonate standard blasting caps, any current exceeding 0.3 v and 0.15 amp is considered dangerous at Lehigh Navigation Co. mines, Mr. Connor said.

With continuous mining machines, safety problems do not differ greatly from those in conventional mining except insofar as speed of advance is concerned, declared R. T. Artz, Health and Safety Branch, U. S. Bureau of Mines, Pittsburgh, Pa., who was the first speaker at the Tuesday session. The main hazard is improper ventilation at the face but there are other safety problems as well, including roof testing and support, gas testing, dust control, visibility, electrical dangers, mechanical hazards and spillage, he said. Mr. Artz's paper is abstracted in the November, 1949, *Coal Age*, pp 94-95.

Continuous mining does not produce surges of methane at the face, as does conventional mining, and a good deal of methane bleeds off during haulage and temporary storage, explained H. A. Quenon, general superintendent, Coal Division, Eastern Gas & Fuel Associates, Grant Town, W. Va., who led the discussion of Mr.



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Artz's paper. This condition, however, should not generate a false sense of security but should point up the need for adequate air at sidings and loading points as well as at the face, he warned. Further developments are needed in fireproof portable stoppings, improved timbering methods and better dust-control devices, he said.

In open discussion following Mr. Quenon's remarks, Mr. C. Fremont Davis raised the question of using auxiliary exhaust blowers and urged that, if they are used, electrical equipment be placed at the intake end of the tubing. R. D. Currie, engineer, General Reinsurance Corp., Trucksville, Pa., pointed out that permissible electrical equipment is designed for safety even when installed in return air and Mr. Sambrook remarked that, after all, there ordinarily is no return air in an auxiliary fan. Richard Maize, secretary, Pennsylvania Department of Mines, speaking, as he said, from limited experience with continuous mining, speculated on the possibility of mounting an auxiliary fan on the miner itself and advancing duct sections as the machine advances. Mr. Maize also cited the need for vigilant gas detection and argued that, though temporary stoppings may be useful, main reliance still must be placed on permanent stoppings.

The coal industry's claims of great advances in safety, with statistics based on accidents per million tons mined, are not borne out wholly when accidents are computed on a man-hour basis, Mr. Davis charged in a paper on accident prevention. "When this industry shakes off the shackles of ancient taboos and ideas, then we can begin to adopt a practical safety program," he said. The charge that coal operators are "mass murderers" is justified "because coal operators who observe the most modern safety rules in their own mines will fight with every weapon at their command to prevent the enactment of legislation which would force all owners and operators of coal mines to observe the same safe practices," he contended. Calling for improved supervision and discipline to enforce safety rules, Mr. Davis urged stricter requirements for qualification as foremen, better training for miners and acceptance by miners of innovations that will increase safety.

Lively discussion of the principles of safety and the responsibility of management and workers followed Mr. Davis' paper. Mr. Maize argued that management is not wholly to blame for accidents, as charged by Mr. Davis, and, taking issue with him on the question of proposed federal mine-safety laws, held out a claim for state laws geared to local needs. The union often obstructs discipline for violation of rules, Mr. Maize added. In answer, Mr. Davis pointed out that all local contracts demand worker compliance with safety rules and



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make management responsible for operating the mines. He also argued that the decline in accidents has been directly proportional to the falling ratio of underground workers to surface workers. As for foreman certification, capability in the Pittsburgh seam, for example, does not imply capability in the Freeport seam because conditions differ, Mr. Davis said.

"If capability in one seam does not qualify a foreman for work in another seam, how does the union justify its demand for a uniform federal mine-safety law?" Mr. Maize asked. Mr. Davis replied that such a law would give miners a basic standard to conform to and would encourage their cooperation.

Michael Kosik, president, UMW District 1, Scranton, Pa., continuing the open-forum discussion, argued that safety is made difficult by foremen who talk safety and tonnage at the same time and declared that safety would be improved if Pennsylvania state inspectors spent less time searching for hidden matches and cigarettes and more time on other safety precautions.

James Forgie, safety engineer, Armo Steel Corp., Montcoal, W. Va., in a move to reconcile the conflicting opinions of management and the union, pointed out that there are so many problems in safety that both sides should stop throwing stones and cooperate, together with state and federal officials, in getting ahead with safety. For example, backing up management in disciplinary action is one area in which the union could advance the cause of safety, he said.

In a prepared paper, Mr. Kosik, declaring that for many years the miner was required to observe rules that he had no hand in shaping, traced increasing union participation in drawing up safety legislation and outlined recent developments in a cooperative union-operator safety program in his UMW district, the first such program in the anthracite field. A safety division was set up Jan. 3, 1949, and by April 23, 360 mine-safety committeemen had been trained by Bureau of Mines instructors, he reported. Soon, at least one qualified safety man will be available for every mine in the district, of whatever size. Five subdistricts have been established and a schedule of monthly meetings has been set up.

Violations noted in federal inspection reports are recorded in the central office and transmitted to whatever mine is concerned for study and for discussion with local management. Joint meetings involving management, the committee and the federal inspector are held following each inspection in an effort to agree on corrective measures needed. In addition, plans now are under way to make a Bureau-taught accident-prevention course available to all workers in the district and to enlarge first-aid training, Mr. Kosik reported.

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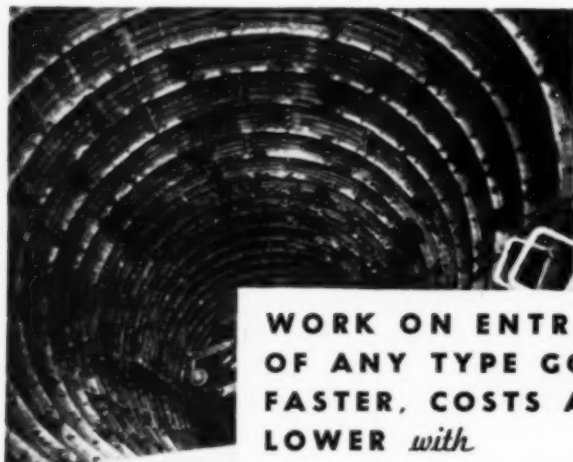
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117 in 1945 to 77 in 1948 and in non-fatalities from 6,239 to 5,327, together with a reduction in combined costs to operators and miners from \$13,162,824 to \$10,180,549, was cited as one of the results of a three-year safety program sponsored by UMWA District 29, Beckley, W. Va., in a report by C. E. Jones, safety director of that district. In addition, the average compensation rate paid by operators has dropped from \$2.80 in 1945 to \$1.78 in the fiscal year ending June 30, 1949, Mr. Jones said. Up to now, he added, about 10,000 men have been safety-trained in District 29 and 2,000 now are taking courses.

Questioned by W. D. Northover, safety director, Rochester & Pittsburgh Coal Co., Indiana, Pa., about the wisdom of computing operators' losses from accidents on the price of coal rather than on the operators' profit, Mr. Jones replied that he had used the price basis because profit figures were not available to him.

Discussing the role of an insurance company in preventing accidents, C. F. Herbert, superintendent, Safety Engineering Department, Bituminous Casualty Corp., Rock Island, Ill., declared that insurance companies must prevent accidents to reduce losses and stay in business. Removing the causes of catastrophes and cutting down the hazards that cause individual injuries are equally important aspects of the insurance company's program, he pointed out. A good insurance inspector must be a safety expert and also a good salesman since, unlike state and federal inspectors, he has no real authority from the state to close down a mine and lacks the prestige of a federal agent. His only recourse is to recommend cancellation of the policy if hazards are not removed—a step that an insurance company may be tempted to forego if competition among underwriters is keen.

Since the premiums charged are influenced by the poor experience of high-accident mines, it is to the advantage of operators as well as the insurance company to spread safety principles and training as widely as possible, Mr. Herbert contended. Along these lines, he explained, his company has organized five safety institutes among supervisors, with monthly meetings for discussion of safety and recent accidents, and has set up other aids to boost safety, including posters, a monthly booklet called "Bituminous Safety Nuggets," sound slides, motion pictures and an industrial-hygiene laboratory.

Accident prevention, whether from the standpoint of the insurance company, the reinsurance company or the operator, revolves around cost, said Mr. Currie, who commented briefly on Mr. Herbert's paper. The main objective of the reinsurance company engineer should be to see that operations are maintained at a level that will compare favorably with the average, since rates are based on average





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conditions and average losses, he said. The inspector's recommendation should be a logical, practicable solution to a problem recognized as such by management and the cost of complying with the recommendation should be less than the cost of accidents that might occur without the change. However, such factors as public opinion and employee good will should be considered in computing the cost of changes, he added.

"Transportation accidents generally cause greater economic loss than any other type of coal-mine accident except explosions and mine fires," said Dennis J. Keenan, state mine inspector, Barnesboro, Pa. Mr. Keenan listed 50 ways to reduce haulage accidents, covering such matters as rail weight, track maintenance, clearances, signal and dispatcher systems, communications, alarm devices, electrical circuits, brakes, illumination, gradients, timbering, training, inspections, speed, hoists, drags, couplings, derail and reraill equipment, mantrip rules, locomotives, shuttle cars, belts, materials-haulage, ropes and accident investigation. He urged organization of an accident-clinic committee in every inspection district to be composed of a state and a federal inspector, a miner and a supervisory representative, a safety engineer and an insurance inspector. This committee, he suggested, should study each accident on the basis of information from the victim, his fellow workers and officials and should make its recommendations known to all mines in the district.

Explaining how his company (1) prepared for wartime and postwar expansion and mechanization by training a backlog of men to fill supervisory positions and (2) then undertook a long-range program to train high-school youngsters to provide a reservoir of skilled men for the years ahead, J. D. Reilly, vice president—operations, Hanna Coal Co., St. Clairsville, Ohio, outlined the role of his company in cooperating with local school authorities and in setting up community youth centers. Mr. Reilly was the first speaker at the Wednesday session. These projects, he explained, were set up to create good will for the company and its management among youngsters, to inform high-school boys about the opportunities in coal mining and thus to slow down the drift of promising young men away from coal-mining communities and the coal industry.

Modeled after an earlier program in Mapletown, Pa., the high-school course in schools near Hanna operations in eastern Ohio includes studies in coal geology, the history of coal, mine gases, ventilation, drainage, transportation, track layouts, coal chemistry and the economics of the industry, Mr. Reilly explained. To supplement their high-school courses, the boys are taken on regular trips through Hanna mines and washeries and are given frequent opportunities

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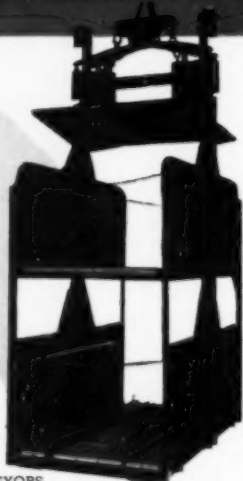
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Classes now are running at four eastern Ohio high schools—Smithfield, Mt. Pleasant, Adena and Dillonvale. Out of a total enrollment of 177 boys in these four schools, 96 have been graduated from the mining course and of these 96, 25% have gone to work in the mines, where they are being transferred from job to job to round out their training. "I believe that the safety records and operating efficiencies of these young men will make an impression which will make them in demand wherever coal is mined," Mr. Reilly said.

Following Mr. Reilly's remarks, W. J. Schuster, Hanna safety director, introduced a panel of four high-school seniors from eastern Ohio, as follows: Harry Caesario, Dillonvale High School; John Grayzar and Gabe Toth, Smithfield; and Lee More, Mt. Pleasant. For nearly an hour, without previous rehearsal, these boys won the applause of their hearers for their answers to questions asked them about their ambitions and intentions; responsibilities of foremen, top management and miners; action to take under various circumstances; the relative importance of safety, quality and tonnage; and such varied subjects as air splits, timbering, roof hazards, powder and explosives, transportation and haulage, mining methods, gas and the flame safety lamp, barometers and anemometers, bratticing, sounding roof, blocking off danger areas and safety discipline. Questions were asked by the following: Messrs. C. Fremont Davis, C. E. Jones, G. H. Sambrook, James Forgie, Richard Maize, and W. D. Northover; and John E. Jones, safety director, Old Ben Coal Corp.; Thomas Allen, chief, Colorado coal-mine inspection department; Arthur Bradbury, safety director, Inland Steel Corp.; and Stanley Mooney, safety director, Woodward Iron Co.

"The best way to improve the industry's safety record is to train men while they are young," said Dr. M. Edmund Speare, educational director, Bituminous Coal Institute, Washington, D. C., who complimented the high-school boys on their performance and cited similar training programs in southern West Virginia, Pennsylvania and Kentucky. Because of the pliability of young minds, it is important that textbooks that discuss coal be corrected and up-dated, he continued, outlining BCI's educational program for schools and colleges.

Dr. Speare attached special significance to a unique plan in Illinois, whereby coal operators and the state university cooperate in conducting a week-long session in coal mining and the coal industry for high-school principals. He also stressed the need for more high-school and college courses in coal mining, more scholarships and more opportunities for summer employment for young men who intend to go into mining. Dr. Speare's remarks were followed by a showing



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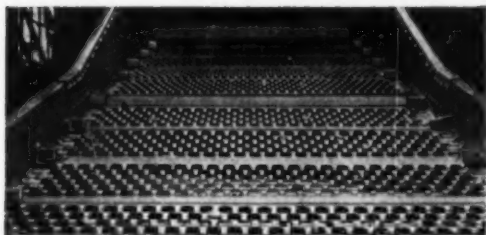
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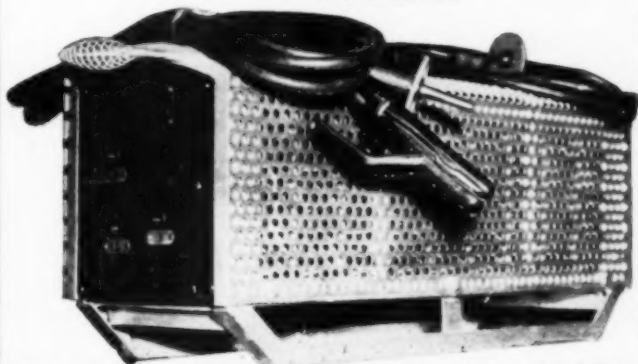
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of a BCI sound film, "Underground Adventure."

"Our accident problems in the coal mines would be solved if a general and active interest in safety among the mine workers could be obtained and maintained," said Mr. Bradbury, whose paper followed Dr. Speare's comments on training and education. Mr. Bradbury attributed the poor safety record of the industry in earlier years to inherent hazards, inadequate profits that forbade expenditures for safety equipment, poor supervision and the feeling of miners and management that accidents were deplorable but inevitable. Tracing improvements in the safety record, he cited state inspections and state laws, the mine-inspection division of the U. S. Bureau of Mines, the Federal Mine Safety Code, the formation of mine-safety committees at each mine, the work of operators' associations and other organizations, the setting up of the UMWA Safety Division and the growth of safety departments within individual coal companies as strong factors in cutting the accident rate.

Stressing education as the key to further safety progress, Mr. Bradbury listed educational aids available, including Bureau courses in accident prevention and safety and high-school mining courses, and urged that the UMWA set up more programs like those in Districts 1 and 29, that the union cooperate in enforcing discipline and that management continue its investments in equipment and methods to improve the record.

The training and safety program of the Red Jacket Coal Corp., Red Jacket, W. Va., and its results were described by J. J. Plasky, training and safety director of that company. He pointed out that coal mining some years ago required only human muscle, a kit of tools worth about \$50 and a few mine cars and a locomotive. Now, he said, the value of machines used by a crew totals about \$75,000 and intelligence and skill therefore are vital ingredients in successful mining. Careful job training thus pays off in greater efficiency and also in fewer accidents. "You cannot train a man to be a safe worker without training him to be efficient," he argued. Mr. Plasky's paper is published in full on pp. 82-87 in the November, 1949, issue of *Coal Age*.

The achievements of organized women's groups in coal-mine safety in Colorado proves that wives, mothers and children can be made powerful influences in accident prevention, declared Mrs. Veda Burford, administrative assistant, state coal mine inspection department of Colorado. The program had its origin in the belief of state mine-inspection officials that every channel for safety training should be exploited and their hope that an approach to miners through the home would add personal factors that were impossible otherwise.

The starting point was first-aid

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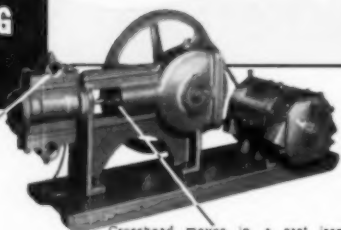


training for members of local groups called Women's Safety Councils, the purposes of which are to (1) be ready at all times to respond if a disaster occurs, (2) provide hot coffee and food to rescue crews, (3) care for the families of disaster victims, (4) render first aid whenever needed and (5) sponsor safety and good fellowship within the community. Mrs. Burford described several accidents and disasters at coal mines and elsewhere at which these trained and organized women have given valuable service and pointed out that because women have learned first-aid and know the danger of infection, there has not been one lost-time accident from infection in any Colorado coal mine for over 10 years where the women and children are part of a safety group. In the first year following the start of the women's program, in 1935, non-fatal accidents decreased by 253. By the end of 1948, non-fatal compensable accidents per 1,000 men employed had been reduced 45.7% and fatalities had decreased annually by an average of 3 1/3 per 1,000 men employed.

Final act of the Coal-Mining Section meeting was the presentation of a plaque awarded by the National Safety Council to Mr. Stahl for outstanding leadership of the section during his term as general chairman. The presentation was made by J. J. Forbes, chief, Health & Safety Branch, U. S. Bureau of Mines, Washington, D. C.

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## Illinois Mining Institute

(Continued from p 151)

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"Why not talk to them about coal-mining engineering, which is not over-crowded and which is calling for capable men right now? Surprise these young friends of yours with information about present-day coal-mining methods—about the matchless versatility of coal in supplying a wide range of human needs, about recent discoveries which make coal's future safe and sure for centuries to come. Suggest to them that they consider entering the department of mining engineering at the University of Illinois, or some other good institution, for the purpose of gaining an education in coal-mining engineering.

"Having done what you can to start boys toward this type of career, get in touch and keep in touch with the department of mining engineering in

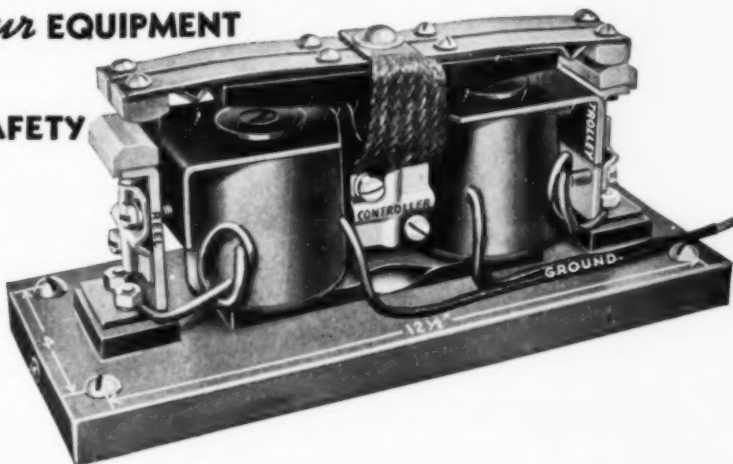
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your state university. Encourage it. Learn its methods. And do all you can to feed desirable candidates into that department.

"Then, most important of all, make it a point to hire as many of these coal-mining engineering students as possible during the months when they are not in school. Summer work will give them an income and, at the same time, be a most valuable part of their education. Help these boys to get the practical side of coal mining in summer, to supplement the technical side which they acquire during the school year. Their summer pay will help defray their college expenses, and such experience, from the ground up, will provide the soundest foundation for their careers that they could have.

"And, now, having persuaded a young man to take the course, and having given him a summer job in your mine—which I am ashamed to say very few of you have done—he graduates, receives his degree as a coal-mining engineer and begins to look around. Where does he go from there? Even though there is a shortage of men in this field, getting the first permanent job always poses a problem for the fellow on whose diploma the ink is scarcely dry. You can and should make that problem easy by giving him a start in your own mine, and I am sure you will rarely regret having done so."

Earlier the Institute adopted a resolution that the Illinois mining law be changed to permit an engineering degree to be substituted for part of the actual mining experience required for certification for coal-mining positions.

Opening the morning technical session, with Mr. Ball presiding, Robert Fletcher, J. H. Fletcher & Co., Huntington, W. Va., summarized a discussion of loading and transfer points for belt conveyors as follows:

"Belt loading and discharge points must be worked out for each installation, as seam characteristics are the governing factor. However, in general, best results are obtained when conditions permit:

- "1. Normal belt speeds.
- "2. Feeding the conveyor with a regulated load.
- "3. Laying the coal on the belt at near-belt speed in the direction of travel.
- "4. Designing transfer chutes to maintain smoothness of flow.
- "5. Reducing impact by minimum drop and use of bar screens or cushioning rolls.
- "6. Providing adequate light, space and periodic inspection."

In discussing loading to belts, Mr. Fletcher summarized the recommendations of the Conveyor Committee of the American Mining Congress, including use of an intermediate surge unit (shaking feeder, heavy-duty chain or elevating conveyor) between shuttle car and belt; the short speed-up chain conveyor to reduce coal drop

to a minimum and lay coal on the belt in the direction of travel and at belt speed; and properly designed skirt-boards and impact rolls to reduce impact. Where conveyors load to belts, drives must be kept back to belt edges and side boards used to center the coal flow, with provision for relief to prevent sticking of lumps through springs or flexible flashing.

In conveyor-to-conveyor transfer of the end-on-type, a bar screen is effective in reducing lump impact. Eliminating bounce requires placing the screen on the proper angle. A curved chute, balanced if necessary to permit coal to pass under it, is helpful where the transfer is at right angles. Supplementary side boards provide final alignment.

Surge hoppers generally are placed between belt systems and preparation plants for storage. The use of stationary slowdown conveyors at the ends of main line and slope belts permits high belt speeds and reduces breakage that would result from abrupt stoppage.

Reporting on the possibilities of conveyor belts of stainless steel, A. B. Crichton Jr., assistant to the president, Johnstown Coal & Coke Co., Johnstown, Pa., summarized findings based on tests starting July 22, 1949, with a 100-ft. unit at Crichton No. 4 mine and on a study of installations abroad, plus certain specialized applications in the United States.

Steel, Mr. Crichton pointed out, offers the possibility of eliminating or reducing many of the handicaps of present belt material, including high weight in relation to strength, weakness of the material, high power requirements (usually two-thirds of the total) for moving the belt itself, high elongation in starting, weak points resulting from splicing, the necessity for multiple drives in covering longer distances, increasing travel time in bypassing transfers where men are handled on belts, and extra provisions for power and water lines to serve transfer points.

The first unit, Mr. Crichton reported, successfully operated on the conventional frame with a conventional drive, using a 21-gage 18-8 stainless-steel strip. Other strips of different composition, qualities and thickness will be tested. The Germans, he commented, are using about 500,000 ft of carbon-steel strip in conveyor service, and steel has been used in Sweden and for certain specialized applications in the United States for some years.

Stainless steel, it is felt, has all the advantages necessary for conveyor work. Connections can be made by riveting, welding or lacing; the material is not affected by rot, mildew, acid water or oil; and idler spacing can be materially increased. In fact, complete elimination of the conventional frame is being discussed. Stands would be used at approximately 50-ft intervals with the belt swinging between them. Take-ups can be eliminated, along with flywheel action,



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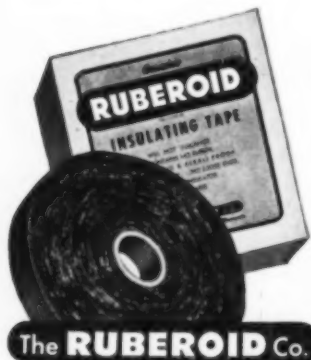
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which increases power requirements.

Present cost of a belt installation, including drive, is about \$20 to \$25 per foot. With stainless steel, Mr. Crichton observed, the cost could be cut to \$4 to \$5 per foot, and if a carbon strip—perhaps rubber coated—can be developed, cost of a 36-in belt might conceivably be reduced to 28c per foot, against \$8 for the present type.

Responding to questions, Mr. Crichton observed that the coil-spring idler—a United States development widely adopted in Germany—has only two bearings per stand, but that whipping action increases power. But if spacing could be increased this latter factor would decrease in importance, while maintenance would be substantially reduced. For conveyors on pitches, the rubber belt is the thing to use, although the stainless belt would offer no difficulty up to around 10%.

"Cooperation," said J. W. Broadway, secretary, Bell & Zoller Coal & Mining Co., Chicago, probably should have been a part of the title of his paper, "Importance of Coordinated Mine Accounting," since without the cooperation of all concerned real coordination cannot be attained. Devoting most of his remarks to procedure at the mine, Mr. Broadway made the point that the increasing influence cost is having on the industry's competitive position warrants the maximum in accounting care and cooperation to keep those costs at a minimum.

Labor represents the biggest item in cost, and it is important that mine supervisors and timekeepers keep accurate records and report the data so that no errors are made in crediting payments to employee accounts.

In the second major category of expense—warehouse and supply operations—considerable carelessness prevails in some instances, making it difficult to achieve economy. He cited the perpetual-inventory system as a good method of obtaining the desired goal, stressed the importance of the supervisor's supplying data on use to permit proper charging and control, and expressed the opinion that where a company operates several mines, a centralized supply system should provide better results by decreasing investment in parts and materials and by reducing labor for handling supplies.

In cost accounting, the form depends upon the type of data required, but in any event the system should provide good cost data. And in workmen's compensation, Mr. Broadway concluded, the records should reflect the types of accidents and their causes to help the operating department in reducing the number. Again, cooperation and coordination are essential in relating mine to general-office records.

Discussing developments in continuous mining, A. Lee Barrett, research engineer, Joy Mfg. Co., Franklin, Pa., sketched the early development of the Joy equipment, starting with the first two prototype units, the first of which went into operation Jan. 16, 1948, and

working through the 30 experimental machines distributed to various sections of the country starting in November, 1948. A major goal was development of a machine as nearly universal in application as possible, and as a result of preliminary experience a number of changes have been made in details, though none was necessary in the fundamental design.

As a result, said Mr. Barrett, the present machines can function in any mining system; room width is no longer an important factor from the standpoint of performance; shuttle-car haulage is the most popular with 400 ft as apparently a good maximum; mine supervision is greatly improved; the size yield is improved in friable coal, is about the same with cleated coal and somewhat down in the denser coals, with yield increasing amazingly where there is a little weight to help out; mine development is speeded through ability to get 300 to 400 tons per shift from one place; roof control is improved in every instance; extraction improved substantially because work is always against solid coal; safety is improved; dust is less a problem and high-pressure sprays are resulting in better control; ventilation is easier; and man exposure is reduced.

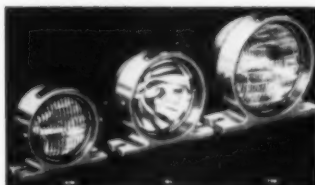
Satisfactory production is being attained, Mr. Barrett concluded, with crews of three to five men generally getting 200 to 400 tons per shift.

In response to questions, Mr. Barrett stated that a number of changes could be expected in auxiliary equipment and operations, such as a swinging rear conveyor on hopper cars, quicker means of installing and removing water piping, returning air behind brattice lines to keep room and face clear, and increased roof pinning.

Uniformity of product is perhaps the most important factor in coal acceptance, declared Robert N. Morris, preparation engineer, Sahara Coal Co., Harriaburg, Ill., in opening the second session, G. Don Sullivan, assistant to the president, Fairview Collieries Corp., presiding, with a discussion of cleaning-plant operation and control. The importance of good preparation is reflected in the staff now in existence at most mines to handle the problem and try to improve on results for the benefit of both the sales department and the user.

With specific gravity the agent in cleaning, control of preparation results, depending upon the character of the washing problem, whether easy or difficult, can be based on (1) visual inspection—quite satisfactory with easy-to-clean types, or (2) chemical and physical properties. These latter tests include ash determination and gravimetric analysis.

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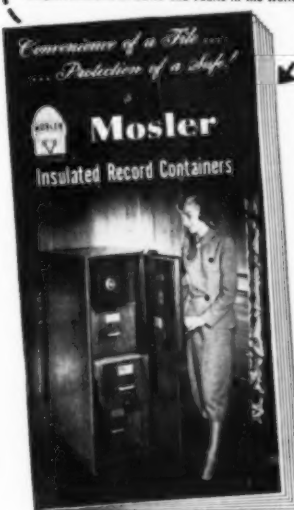
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Overloading of equipment, Mr. Morris concluded, should be watched and avoided, since the results usually are a drop in quality, poorer oil treatment and so on, with increased consumer dissatisfaction.

Sketching the history of cable design and the early difficulties encountered, L. E. Briscoe, electrical engineer, Ayrshire Collieries Corp., Indianapolis, Ind., discussed methods of finding faults now used by electricians as the basis of a plea for the development of better fault-finding methods and equipment. In high-voltage portable cables, these faults are both visible and non-visible, the latter providing the electrician with a real task in locating them prior to making repairs.

Without the neutral ground resistor, introduced about 1930 to protect men and equipment, faults usually resulted in visible damage, which made location easy but presented hazards. With the neutral ground resistor, a fault can occur that is not readily visible. And since ground-fault protective equipment now is being installed on 440-volt circuits similar to that for 4,160-volt systems, the problem has been broadened even more, with additional possibility of loss of operating time in location and repair.

Ordinarily, said Mr. Briscoe, the electrician could find and repair a fault more quickly if the mine personnel would remain calm and act sensibly. Location methods generally used in finding invisible faults, he continued, are as follows:

1. Instructing employees to stay away from the machine and placing them at intervals along the cable, after which the breaker is repeatedly reclosed until the fault becomes visible or audible.

2. Bypassing the neutral ground resistor with a short-circuiting disconnecting switch, after getting men into the clear, and then reclosing the breaker to blow a hole in the cable—with resultant cable damage and danger of fire.

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with a resistor to limit current flow. The resulting hot spot is located by walking the cable.

4. Connecting 110 ac single-phase in series with a lamp to the cable, one leg to ground wire and another to the phase known to be grounded, then proceeding along and bending the cable. If the light goes out, the fault is in the vicinity of that particular bend.

5. Replacing the cable.

There are, Mr. Briscoe stated, other crude methods employed by electricians. "There is definitely a need in the coal-mining industry for a portable instrument—self-contained, inexpensive and light in weight—for locating non-visible faults in cables. The instrument should require no calculations on the part of the operator in locating the fault. It should indicate the fault either by sound or light. Higher operating efficiency of a unit might be obtained if an electrician had available an instrument to detect a fault in a cable before actual failure occurred."

The higher cost of down time and growing use of electrical equipment have focused increasing attention of equipment for locating cable faults, declared H. R. Stoddard, Chicago district engineer, Simplex Wire & Cable Co., in discussing units now available. The desirable characteristics of such a unit were stated by Mr. Stoddard as follows:

"The equipment should be light in weight, portable, self-powered (or able to use any available source of supply), require few adjustments, need no mathematical calculations, be capable of operation by personnel immediately available, non-destructive, able to locate faults rapidly and, finally, relatively inexpensive."

Equipment available falls into three general classifications:

1. Electrical-bridge units, which are harder to use and are delicate, but are small in size, self-powered and portable.

2. Operating-system equipment, such as outlined by Mr. Briscoe, which have the desirable features of being available on the job and using a minimum of equipment. However, it is sometimes difficult to locate a fault and extra hazards and added cable damage are possibilities.

3. Tracer-current equipment, which sends out over the cable, previously disconnected, a pulsed or distinctive ac signal. A pick-up coil attached to headphones, either with or without electronic amplification, provides an audible signal as the coil is moved along the cable. In general, the apparatus is light, self-powered or adapted to 110-v 60-cycle current, is relatively inexpensive and requires little skill.

A second device sends out a dc pulse and is generally known as "condenser-discharge" equipment. The fault is located by inducing a discharge to ground, which is located by sound. The apparatus can be made compactly and requires not over 500 watts of 110-v

ac. Some cable damage is possible, though this can be minimized by lowering the dc voltage. Usually, no external pick-up coil is required. The characteristics of the unit are such that it has real possibilities in mining.

"It has been our general experience in locating faults that no one particular device will locate all types of faults. The combination of the two tracer-current units probably will be most effective in locating practically all types of faults in trailing cables. The very fact that the cable is visible and accessible throughout its entire length is a real advantage in fault location, and it would seem that suitable techniques in the use of the devices can readily be developed to the point where fault-location time can be kept to the minimum."

A motion picture showing the operation of the Kolbe wheel excavator, with comment by J. J. Huey, electrical engineer, United Electric Coal Cos., concluded the technical sessions. Used for removing the softer top part of the overburden by a revolving wheel with digging buckets on the rim and discharging to a belt leading to a stacking conveyor, the latest of the two units used by the company can remove 1,500 to 2,000 cu yd per hour. The average is 1,200 per hour.

## Coal Publications

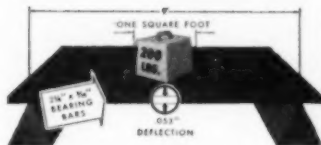
**Mechanics: Statics and Dynamics**, by Merit Scott. McGraw-Hill Book Co., Inc., 330 W. 42d St., New York 18. 394 pp. 6 1/4 x 9 1/4-in; cloth. \$4.50. A textbook and reference book designed to bridge the gap between first-year college physics and higher mathematics and requiring knowledge of calculus, series expansions, Taylor's theorem and some analytical geometry. An introductory chapter provides needed information about vector notation and analysis. Includes problems for solution.

**Vitalizing the Foreman's Role in Management**, by Glenn Gardiner and Robert L. Gardiner. McGraw-Hill Book Co., Inc., 330 W. 42d St., New York 18. 274 pp. 6 1/4 x 9 1/4-in; cloth. \$3.50. A book of cases analyzing situations in which companies have set up effective programs to strengthen the foreman's part in management. Designed for executives who seek ways to bring foremen into more active participation in management.

**Thermal and Electrical Properties of Anthracite and Bituminous Coals**, by J. D. Clendenin, K. M. Barclay, H. J. Donald, D. W. Gillmore and C. C. Wright. Reprinted from "Transactions of the Seventh Annual Anthracite Conference at Lehigh University." 67 pp. 6x9-in; paper. No price quoted; available from Anthracite Institute, Wilkes-Barre, Pa., or The Director, Mineral Industries Experiment Station, State College, Pa.



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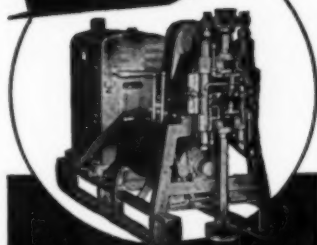
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**Review of Current Research and  
 Directory of Member Institutions,**  
 1949. Engineering College Research  
 Council, American Society for Engi-  
 neering Education. 186 pp. 6x9-in;  
 paper. \$1.75; F. M. Dawson, chair-  
 man, University of Iowa, Iowa City,  
 Iowa. Listing of over 4,000 college  
 and university engineering research  
 projects now under way, together  
 with statements of policy, courses,  
 personnel and available funds at 82  
 educational institutions.

**Preliminary Maps and Reports Re-  
 leased by the Geologic Division, 1946-  
 47, and by the Conservation Division,**  
 1938-47, by R. A. Atherton, W. H. Eck-  
 stein and R. E. Spratt. U. S. Geologi-  
 cal Survey Circular 56. Free, Director,  
 U. S. Geological Survey, Washington  
 25, D. C. Data for property owners  
 and mine operators concerned with  
 exploration for and development of  
 minerals, fuels and construction ma-  
 terials.

**Revised Bibliography of Bureau of  
 Mines Investigations on the Produc-  
 tion of Liquid Fuels from Oil Shale,  
 Coal, Lignite and Natural Gas (to  
 1949),** by N. Golumbic, H. C. Ander-  
 son and R. C. Grass. U. S. Bureau of  
 Mines, I. C. 7534. 53 pp. 8x10½-in;  
 paper; mimeo. Free, Publications Dis-  
 tribution Section, 4800 Forbes St.,  
 Pittsburgh 13, Pa.

**Review of Literature on Condition-  
 ing Air for Advancement of Health  
 and Safety in Mines, Part III: Meth-  
 ods of Controlling the Chemical and  
 Physical Qualities of Underground  
 Air,** by J. J. Forbes, S. J. Davenport  
 and Genevieve Morgis. U. S. Bureau  
 of Mines, I. C. 7528. 57 pp. 8x10½-in;  
 paper; mimeo. Free, Publications Dis-  
 tribution Section, 4800 Forbes St.,  
 Pittsburgh, Pa. Particulate and gase-  
 ous contaminants; temperature, hu-  
 midity, motion, pressure and foggi-  
 ness; explanation of instruments;  
 sources of heat in mines; and meth-  
 ods of cooling mine air.

**Routine Ventilation Surveying in  
 South Wales Anthracite Mines,** by  
 C. M. Smith. U. S. Bureau of Mines,  
 I. C. 7530. 11 pp plus 3 pp of charts  
 and illustrations. 8x10½-in; paper;  
 mimeo. Free, Publications Distribution  
 Section, 4800 Forbes St., Pittsburgh,  
 Pa. How ventilation surveys are made  
 regularly in 10 mines every four  
 months and 14 mines every six months  
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 survey takes about a week, the engi-  
 neers dividing their time equally be-  
 tween field and office tasks.

**The V. I. Story—Varnished Insula-  
 tions in Electrical Engineering,** by  
 D. O. Woodbury. Varnished Fabric &  
 Paper Section, National Electrical  
 Manufacturers Assn., New York 17,  
 N. Y. 88 pp. 5½x7½-in; paper. \$1.  
 Origin, development, nature, purposes  
 and uses of varnished insulation for  
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 bles, power distribution systems, mo-  
 tor controllers, etc.



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Write for Bulletin 375

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### The Supervisor's Management Guide

—For All Who Supervise Others, M. J. Doohar and Vivienne Marquis, editors. American Management Association, 330 West 42nd St., New York 18, N. Y. 190 pp. 6½x9¼-in; leatherette. \$3 for association members; \$3.50 for non-members. Twenty chapters, with space for notes at end of each, on human relations, supervisor's attitudes and practices, worker morale, emotional problems, public speaking and other subjects. Tests for supervisors and executives. This handbook is a sequel to two others.

### Preparation Facilities

T. C. I. & R.R. Co., Concord No. 1 mine, Ensley, Ala. Deister Concentrator Co. reports shipment of three Type 108-B Concenco revolving feed distributors and 16 SuperDuty Diagonal-Deck No. 7 coal-washing tables.

West Virginia Coal & Transportation Co., West Columbia, W. Va.—Contract closed with Jeffrey Mfg. Co. (by Roberts & Schaefer Co.) for Baum jig; capacity, 225 tph of 6x%-in coal.

Coal Service Corp., Clarksburg, W. Va.—Contract closed with Jeffrey Mfg. Co. for unit washer; capacity, 90 tph of 4x%-in coal.

K. M. & F. Coal Co., Middleport, Pa.—Contract closed with Menzies Separator Co. for 4-ft Menzies cone to clean buckwheat and smaller; feed capacity, 22 tph.

Moffat Coal Co., Taylor, Pa.—Contract closed with Menzies Separator Co. for one 8-ft Menzies cone to clean steamboat and broken coal, feed capacity, 90 tph; and one 8-ft Menzies cone to clean broken and egg coal, feed capacity, 90 tph.

Central Coal Co., Monterey, Tenn.—Contract closed with Western Machinery Co. for one No. 2C WKE (HMS) Mobil-Mill heavy-media unit to treat 40 tph of feed coal sized at 4-in round by 3/16-in square.

Philadelphia & Reading Coal & Iron Co., Locust Summit central breaker—Contract closed with Western-Knapp Engineering Co., Division of Western Machinery Co., for construction of a new flotation plant for recovery of fine sizes from breaker water.

J. A. C. Coal Co., Minersville, Pa.—Contract closed with Wilmot Engineering Co. for one 3½-ft-diameter Wilmot Hydrotator to alternately prepare stove and nut coal; feed capacity, 40 tph.

J. A. C. Coal Co., Mt. Carmel, Pa.—Contract closed with Wilmot Engineering Co. for three 2½-ft-diameter Wilmot Hydrotators to prepare buck-

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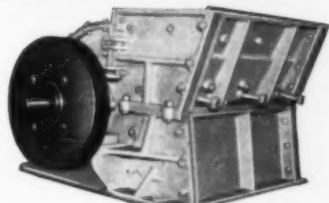
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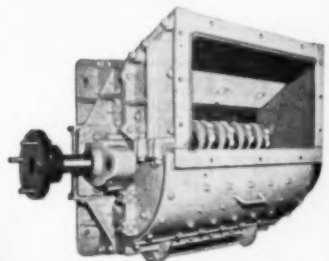
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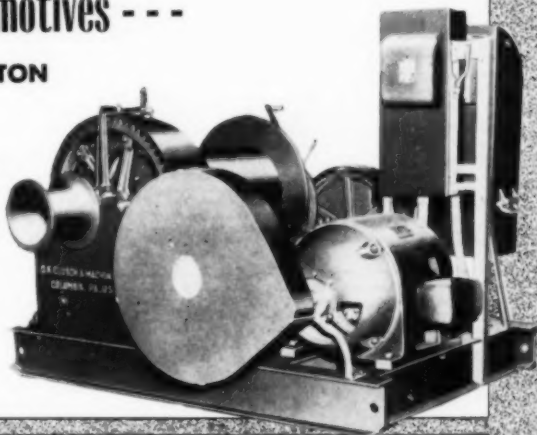
Coal eye view of XXE showing heavy duty manganese breaker plates and ring hammer rotor coal breaker.

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**Glen Alden Coal Co., Wanamie colliery, Wanamie, Pa.**—Contract closed with Wilmot Engineering Co. for one 8-ft-diameter Wilmot Hydrotator to prepare barley; feed capacity, 75 tph.

**Rhoads Contracting Co., Lykens, Pa.**—Contract closed with Wilmot Engineering Co. for one 2½-ft-diameter Wilmot Hydrotator to prepare pea coal; feed capacity, 20 tph.

**Jamison Coal & Coke Co., No. 21 mine, Hostetter, Pa.**—Contract closed with Jeffrey Mfg. Co. (by Industrial Engineering & Equipment Co.) for eight-cell Baum Jig; capacity, 250 to 350 tph, 5x0-in coal.

**Rochester & Pittsburgh Coal Co., O'Donnell mine, Four States, W. Va.**—Contract closed with Jeffrey Mfg. Co. for two-compartment diaphragm jig; capacity, 160 tph, 5x½-in coal.

**Blackfoot Coal & Land Corp.,**

**Blackfoot mine, Oakland City, Ind.**—Contract closed with Robert Holmes & Bros., Inc., for complete new drying-plant addition consisting of five Baughman Verti-Vane thermal coal dryers, including necessary auxiliary equipment, 6x16-ft Allis-Chalmers Ripl-Flow triple-deck vibrating screen, engineering, construction and erection; addition to collect 250 tph of 1¼x28-mesh coal from existing shaker screens and centrifugal dryers and after drying classify it into marketable sizes.

**South Union Coal Co., Edna, W. Va.**—Contract closed with Robert Holmes & Bros., Inc. (by Industrial Engineering & Contracting Co.), for three Baughman Verti-Vane thermal dryers, to reduce moisture of minus-1-in coal at an approximate rate of 125 tph.

**Youngstown Mines Corp., Dehue mine, Dehue, W. Va.**—Contract closed with Nelson L. Davis Co. for complete Davis Heavy-Media Float-and-Sink processor for Heavy-Media separation, including horizontal vibrating screens for feed coal, horizontal vibrating and Ripl-Flow screens for separating ¼x0 from minus-4-in coal, McLanahan-type Rockmaster crushers for reducing plus-4-in to 4-in and under and also for crushing rock to minus-8-in, and necessary auxiliary equipment; r-o-m from dumping cages to be screened and separated at 4 in, with the 4x¼ cleaned by the Davis Heavy Media processor and the ¼x0 by-passed and loaded with cleaned product; arrangements to be made for installation of additional fine-coal cleaning equipment at a later date; plant capacity, 350 tph of r-o-m dumped, with the 4x¼ to be cleaned at approximately 300 tph.

**Buckeye Coal Co., Nemacolin mine, Nemacolin, Pa.**—Contract closed with Nelson L. Davis Co. for screening, conveying, crushing and other coal-washery equipment, Davis-type rotary dewatering elevator wheel with fine-coal handling, equipment for receiving fine coal and feeding it to free-discharge fine-coal launders, rearrangement of present carpenter-type dryers and an additional Carpenter dryer; total feed to launders, 250 tph, fine coal.

**Rochester & Pittsburgh Coal Co., O'Donnell mine, Four States, W. Va.**—Contract closed with Heyl & Patterson, Inc., for coal-washing plant, including Jeffrey two-cell jig with dewatering screens and sludge tank; 5x½-in coal to be washed and remixed with ¾x0; plant capacity, 300 tph; washing capacity, 200 tph.

**G. & W. H. Corson, Inc., Philadelphia Electric plant, Norristown, Pa.**—Shipment by Deister Concentrator Co. of two SuperDuty Diagonal-Deck No. 7 coal-washing tables, one Leahy heavy duty NO-Blind vibrating screen with water-spray assembly and one Concenco revolving feed distributor; to be used for reclamation and preparation of river-silt anthracite.

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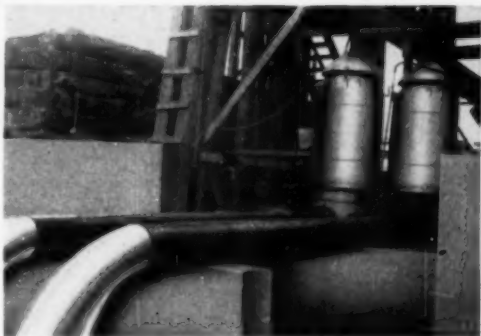
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DRILLING CONTRACTORS AND MFRS.

1205 Chartiers Ave. **PITTSBURGH, PA.** WAsh 1-8816

# KEEP MINES DRY!

## With Less Man-Hours



● Features of Deming Mine Pumps are engineered for dewatering service requiring a minimum of manual attention.

Deming Deep Well Turbines (illustrated above) permit operation through bore holes to dewater isolated or closed-off mine sections. Adjustments of working parts can be made from the surface. Cutless rubber pump bearings are water lubricated. Pump can be removed at any time for use in other locations. Capacities from 15 to 3000 g.p.m. Write for Catalog 4700-8.

### DEMING SELF-PRIMING MINE PUMPS

Automatic pumping from pits and other mine services are performed with Deming Self-Priming Centrifugal Mine Pumps. These pumps are non-siphoning and will reprime automatically regardless of the amount of back-wash, or suction line surge encountered upon pump stoppage.

Capacities range up to 250 g.p.m. with heads up to 100 feet at motor speeds of 1750 R.P.M. Write for Catalog No. 3300-A.

### THE DEMING COMPANY

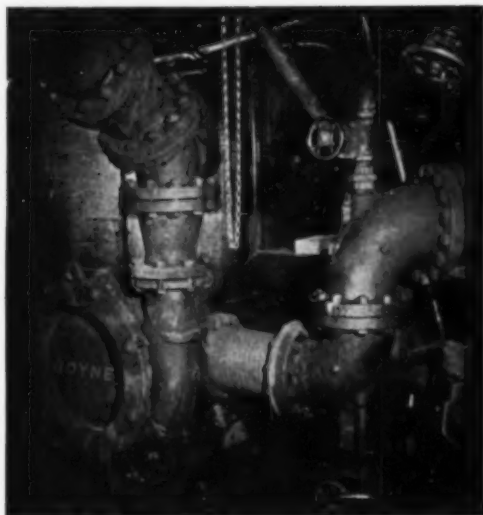
533 Broadway • Salem, Ohio

Fig. 3332 Deming Self-Priming Centrifugal Pump . . . one of a line of self-priming pumps for mine service.



# DEMING Mine Pumps

## GOYNE PROCESS PUMPS



A Sand Pump is only a link in a chain in a coal washing plant, but it can be a strong link if it embodies the following features as does the Goyne.

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing only the rear head of the pump. No suction or discharge piping is disturbed.
2. The one packing box of the pump subjected only to suction pressure and is readily kept clean by a low pressure clear water line. Long packing and shaft sleeve life is assured.
3. Impeller clearance is adjusted while the pump is running, insuring constant pump capacity so essential for uniform washing.
4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.
5. We carry the spare parts stock. Order your replacements when needed. Reduce your inventory by using Goyne Process Pumps.

*All inquiries receive prompt and careful attention.*

**THE GOYNE STEAM PUMP CO.**  
ASHLAND, PA.



**FOR HEAVY  
CONVEYOR  
AND ELEVATOR  
BELTS OF  
ANY WIDTH**

# FLEXCO

**BELT  
FASTENERS  
AND  
RIP PLATES**

FLEXCO Fasteners make a tight, butt joint of great strength and durability . . . distribute the strain uniformly. Operate smoothly over flat, crowned or take-up pulleys. Made of steel, Monel, Everdur and Promal.

FLEXCO Rip Plates are for repairing and patching damaged belts.

Ask for Bulletin F-100

**FLEXIBLE STEEL LACING COMPANY**  
4638 Lexington St., Chicago 44, Illinois



**Strong, Smooth and  
Readily Troughing.**  
Order From Your  
Supply House



## Sink-Float Magnetite "MAGNAFLOAT"

Correctly sized Magnetite for sink-float treatment of coal or other minerals. Standard grinds;

Grade A—Approximately 100 mesh with 60 to 70% passing 325 mesh.

Grade B—Approximately 100 mesh with 90% passing 325 mesh.

Other sizes to order.

Executive Offices

**FOOTE MINERAL COMPANY, INC.**

420—Eighteen West Chelton Bldg. Philadelphia 44, Pa.  
Over 30 years grinding experience.



**PERFORATED METAL  
COAL MINING SCREENS**

*Manufactured exactly to your specifications.  
Any size or style screen, in thickness of steel  
wanted with any size perforation desired.  
We can promptly duplicate your present screens at lowest prices.*

**CHICAGO PERFORATING CO.**  
2445 West 24th Place  
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VI. 7-0757

## "Sutton" SAND DRYING STOVES

The Standard for Over Forty Years

### Burns Any Type of Fuel

The "Sutton" Sand Dryer may be fired with any type of fuel. While most "Sutton" Sand Dryers are equipped to burn coal, they can be furnished with burners for natural gas or fuel oil.



#### "SUTTON" FEATURES

- Simple in operation
- No skilled labor necessary
- Made in four sizes
- Lowest original cost
- Economical up-keep
- Topmost efficiency

**SATISFACTION GUARANTEED**  
Catalog and Prices sent upon request

### INDIANA FOUNDRY COMPANY

950 Oak Street

Indiana, Pa.

## At Your Service . . .

The Searchlight Section is at your service for bringing business needs or "opportunities" to the attention of men associated in executive, management, sales and responsible technical, engineering and operating capacities with the industry served by this McGraw-Hill publication.

## ARMSTRONG-BRAY

**WIREGRIP** Belt Hooks come with extra (patented) blue aligning cards—that assure perfect alignment of hooks—less hook loss and a better job when applied. 6 sizes.

**PLATEGRIP** Fasteners for . . . Conveyor Belts. Make strong dust-tight joints in belts of any width. Spread tension uniformly. Allow natural troughing of belt. Operate smoothly over flat, crowned or take-up pulleys. Sizes for belts from 1/4" to 1 1/2" thick. Easily applied.

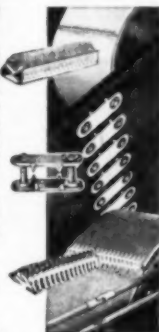
**STEELGRIP** Flexible Lacing, applied with a hammer, clinches over and protects end of belt. Makes strong, flexible joints. Boxed with 2-piece hinged rocker pins or in long lengths.

### ARMSTRONG-BRAY & CO.

"The Belt Lacing People"

5340 Northwest Hwy.

Chicago, Ill.



COAL AGE • December, 1949

NOW YOU CAN

*Support*  
**Low-voltage Accessories**  
*without* reducing  
**High-voltage Power**

## WITH A LEECE-NEVILLE HIGH-OUTPUT A-C GENERATING SYSTEM

• On continuous miners, loaders and other mining equipment . . . the amazingly high output of Leece-Neville A-C Generating Systems can support automotive type lighting and any other low-voltage accessories, eliminating the need for reducing low-voltage power. On vehicles operating above ground, these systems keep batteries fully charged at all times. The costly part of battery maintenance is eliminated . . . life of batteries prolonged. So much current is generated you can use accessories without limitation.

Proved in thousands of applications on all types of equipment during the past three years, A-C generating the Leece-Neville way pays for itself many times over. It will pay you to return coupon below for all the facts!



**ALTERNATOR** of Leece-Neville 7-Volt A-C System for every requirement up to and including 80 amperes. 14-Volt Systems available with ratings of 60, 80, 100 and 150 amperes.

# LEECE-NEVILLE



**Pioneer and STILL Quality Leader**

CRANKING MOTORS • GENERATORS • VOLTAGE REGULATORS • SWITCHES

THE LEECE-NEVILLE CO., Department H, Cleveland 14, Ohio  
Please send descriptive literature on your High-Output A-C Generating Systems.

NAME

ADDRESS

CITY

STATE

# SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

## UNDISPLAYED RATE:

Not available for equipment advertising 90¢ a line. Minimum 4 lines. To figure advance payment count 5 average words as a line. (See § on Box Numbers.)  
INDIVIDUAL EMPLOYMENT WANTED undisplayed advertising rate is one-half of above rate, payable in advance.  
PROPOSALS, 90 cents a line an insertion.

## INFORMATION:

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count one additional line in undisplayed ads.  
DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

## DISPLAYED RATE

The advertising rate is \$7.25 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.  
AN ADVERTISING INCH is measured 1/8 inch vertically on one column, 3 columns—30 inches—to 4 page.

NEW ADVERTISEMENTS received by 10 A.M. December 13th will appear in the January issue subject to limitations of space available.

## SALES ENGINEER

With experience in coal preparation for nationally known product, large territory, must be willing to travel. Car essential.

SW 1457, Coal Age,  
520 N. Michigan Ave., Chicago 11, Ill.

REPLIES (Box No.): Address to office nearest you.  
NEW YORK: 330 W. 42nd St. (18)  
CHICAGO: 520 N. Michigan Ave. (11)  
SAN FRANCISCO: 68 Post St. (4)

## POSITION VACANT

WANTED: ENGINEER, Southern Indiana Strip Mine, 500,000 Ton Annual Production, has opening for experienced strip mine engineer. Send snapshot with qualifications to P-1429, Coal Age.

## POSITION WANTED

EXPERIENCED SALESMAN, proven performance, clean habits, now employed, desires connection to travel Virginia, Tennessee, Kentucky. Or will take several lines on commission. PW 1504, Coal Age.

## MODERN MINING EQUIPMENT FOR SALE

200,000 CM and 1,000,000 CM Feeder Cable, 3 Section Trolley Wire. All like new.  
Two Joy Loaders, 14 BU—Late Type.  
Two Joy Loaders, 8 BU—Late Type.  
One Joy Loader, 12 BU—Late Type.  
One Joy Elevating Conveyor.  
One 28" Joy Chain Conveyor—400' long.  
Three Goodman Type 824 Slabbing Machines.  
Three 12AA and 112AA Shortwall Machines.  
Six G. E. 6-ton Locomotives.  
Four 200 KW, G.E. Rotary Converters.  
100 KW, G.E. MG Set—Jeffrey Coal Drills.  
Ingersoll Rand Air Compressors—Track Mounted.

Rock Crushers—Bronze and Cast Mine Pumps.  
16-ton Mine Scale with Streeter Amat Recorder.  
Boom-hoists — Loading Booms.  
Complete Machinery for Tipple, 3 & 5 Track.  
New Link Belt Vibrators, 6'x12' and 3'x10'.  
Drop Bottom Mine Cars, 48" Gauge.  
50 New—60 Used, End Dump Mine Cars, 44" Ga. Also 48"  
200 Tons Ea. 60" and 50" Rail—Other Sizes Also.  
44" and 48" Ga. Steel Mine Ties, 25' and 40'.

Hundreds of other Items—Parts—Supplies—Priced to Sell.

We Buy — Sell — Trade

J. T. FISH & COMPANY

Logan, W. Va.

Phone 2825

## MINE FOR SALE

230 acres under lease. \$45,000 net profit last year; 28 reliable employees. Fully equipped and electrified operation, 100 miles from Cleveland S.E. 40 inch high-quality vein; analysis on request. Hi-lift shovel, trucks, all in top condition. Total price, all stock included, \$75,000.

A. KORYTA, INC.

1311 Schofield Bldg. Cleveland, Ohio

## MINING EQUIPMENT FOR SALE

We have the following equipment for sale at our Hocking mine, which is about four miles north of Athens, Ohio:

Joy 14 BU loader.  
Joy 32-E shuttle car.  
Joy elevator.  
Joy 8 BU loader.  
G.E. 10 ton locomotive—45" gauge.  
Jeffrey MH-100 locomotive—8 ton.  
Jeffrey MH-55 cable reel locomotive.  
G.E. 150 KW converters, complete with switchboards and transformers.  
G.E. 100 KW converter, complete with switchboards and transformers.  
Jeffrey 6-A drills.  
Goodman shortwall.  
Robins vibrators.  
Jeffrey 6-A drills.  
Bank cars, Joy parts, loading booms, belt conveyors, feeders and other items too numerous to mention.

COTTINGHAM, INC.

Nelsonville, Ohio

Phone Nelsonville 236

Athens 832

Athens 24002

## FOR SALE

1—G-15 Goodman Shaker Conveyor, complete with switch and 300 ft. of run line.  
Price \$2,000.00

1—25 KW, 250 volt D.C. Crebber Wheeler Generator, 275 R.P.M.

FISCUS COAL CO.

R. F. D. No. 1 Leetonia, Ohio  
Phone Leetonia 3755

## FOR SALE

Diesel Generator Plant

1—150 KW Westinghouse DC Generator, 250 v., driven with two (2) Buda Diesel motors (5/4x6"), complete and guaranteed.

Gasoline Generator Plant

1—35 KW DC Generator Plant, driven with new Buda gasoline engine, complete and guaranteed.

If interested, contact:

Atlas Supply & Equipment Company,  
305 North Fourth Street,  
Clarksburg, West, Va.

## FOR SALE

3—X1261CM 6'6"2 3/4" Korf Cutter Bars for Sullivan 5B. Cost \$767.00.  
Price: \$250.00 each.  
3—13125M Sprockets for above. Brand new. Cost \$121.50. Price: \$40.00 each.  
2—SK10761 Cutter Chains for above bars. Cost \$528.00. Price: \$250.00 each.  
1000 1/2 x 1 hardened Bits to fit above. Cost 14 1/2¢ each. Price: 10¢ each.  
Cutter Bars and Chains operated one hour in experimental work.

GEORGE C. WATSON

3325 Monaco Blvd.

Denver, Colorado

OTTUMWA HOIST: cylindro-conical, 1" rope groove, hoisting range to 400', 150 HP AC 2300 volt motor, complete with all magnetic controls ready for operation, excellent condition.

SHEAVES: 2—60" wrought iron, deep groove for 1" rope with shaft and boxings, practically new, \$75.00 each fob.

RR TRACK SCALE: 100 ton, 50 ft., weighs perfectly, \$500.00 where-is, now set up for operation.

ELMIRA COAL COMPANY

Excelsior Springs, Mo.

## STOKER SIZING CRUSHER

Pittsburgh M.Nally Crusher, size 10"x10" two roll with 1/2" pyramid teeth. Maximum feed 2", maximum output 56 T.P.H. Built for making 1/4" or 1/8" roller coal. Complete with 10 H.P. Motor, 220 Volt Motor and V Belt Drive. F.O.B. Mullins, W. Va. \$350.00.

HALL-RAE

614 Bessemer Bldg. Pittsburgh 22, Pa.

## WANTED

## WANTED

DIAMOND CORE DRILL  
HYDRAULIC FEED 600 FT. CAPAC.  
WITH OR WITHOUT ENGINE

W-1135, Coal Age

330 W. 42nd St., New York 18, N. Y.

## FLOTATION MACHINES

3—No. 24, 8-cell, Denver "Sub-A" Flotation Machines, wood tanks, rubber impellers, 43"x43" cells, motorized.

## JIGS

2—New 18"x36", 4-compartment Hartz Jigs, Oregon Fir Construction.

## FILTER

1—4", Six Disc Eimos Filter, complete with vacuum equipment—motorized.

## GENERATORS — DIESEL

3—D-11000 Caterpillar Diesel Generators, 75 KW, 440 volts, AC.  
1—D-4400 Caterpillar V-belted to 30 KVA, AC Generator.

## FREIGHT ELEVATORS

1—Nock & Garside Continuous, Push button Type, Capacity 3000 lbs. Traveling Speed 285 RPM, direct connected to 25 HP Motor, complete with counter weights, wire rope, etc.

## PIT CARS

150—Card Iron Works R.B. Pit Cars, 36" gauge.  
1—Card Iron Works Rock Car, 90 cu. ft. capacity.

## BINS &amp; WATER TANKS

2—20"x20" Wood Stave Bins.  
1—Wood Stave Water Tank 20' dia. x 12' high.

## WAGON DRILLS

1—Ingersoll Rand, with drifter, all on pneumatic tires, used about 6 months.  
1—Sullivan #1W 6, with drifter, on steel wheels. AC Motor.

## TROLLEY LOCOMOTIVES

2—7½ Ton Goodmans, 36" gauge, 250 volts DC.

## LARRY CARS

4—Connellsville Larry Cars, Trolley Operated, 6 Ton Capacity.

## COAL CRUSHERS

1—36" American Ring Type.

## MAGNETIC PULLEYS

1—24" Belt Feeder, 5/6" centers, with 26" face x 24" dia. Dings Magnetic Pulley, R.C. Drive to 2 HP Gear Motor, complete with motor generator set.  
2—36" face x 24" dia. Dings 250 volts DC Magnetic Pulleys.

## COAL WASHING EQUIPMENT

2—Rheolaveur Launderers, complete with steel supporting frame.  
1—60" dia. Dividing Table, direct connected to 2 HP DC Motor.  
1—Galigher Auto. Sampler with adjustable stroke and direct connected to a 1/6 HP Motor.  
1—12"x10" Steel Hopper Bin.  
1—70"x12" Dorr Thickener Tank, complete with mechanism.

## BELT CONVEYORS

1—14", 20' centers, new belt, V-belted to 1½ HP Motor.  
1—24", 15' centers, Motorized.  
1—30", 30' centers, new belt, on steel frame R.C. Drive to a 2 HP Gear Motor.  
1—42", 20' Centers, Motorized.

## MISCELLANEOUS EQUIPMENT

2—1½ Ton Coffing Single Chain Hoists.  
Electric Mine Gongs.  
Wooden Telephones.  
Air Receivers.  
1—Manierre Type Box Car Loader—5 HP Motor.  
1—45" Universal Mine Fan with built-in 2 HP Motor.  
Motors ½ HP to 75 HP—New and Used.  
Mine Cages.  
Hydrosol Slurry Pumps—2" to 8".  
Revolving Screens.  
Fire Extinguishers.  
1—CE-7 Sullivan AC Coal Cutter.

WRITE FOR NEW BULLETIN NO. 10

## FLORENCE MACHINERY AND SUPPLY COMPANY

SUITE 904, EQUITABLE BUILDING

DENVER 2, COLORADO

C. J. PARRISH, MGR.

## HEAT PORTABLE HEATER SALE!



## 100,000 BTU PORTABLE HEATER AND DRYER

Warner portable, powerful 100,000 BTU gas oil-burning heater, with Turbine type blowers; 1½ hp. air-cooled, ball-bearing engine; 3 doors (45" H. total). IMMEDIATE DELIVERY

Excellent Operating Condition Guaranteed  
Especially Adaptable for MINE USE

**HEATING** Mills, bunkhouses, Dry Rooms, Sheds, Warehouses, Bldgs. under construction, spot heating, etc.

**THAWING** Frozen Ore, or preventing freezing in Ore Bins, Frozen Areas, Machinery, Pipe Lines, Tanks, etc.

**DRYING** Concentrates in Ore in conjunction with Tumbler; Wet ore in bins; Plaster, paint, mortar, etc.

**PRE-HEATING** engines, tractors, trucks, equipment, etc.

• VAST QUANTITY OF REPLACEMENT PARTS  
• Also SERVICE MANUAL & PARTS CATALOG  
PHONE COLLECT—your Heater can be shipped within 2 hours. OR, SEND FOR LITERATURE.

**BERNSTEIN BROS.**  
MACHINERY CORPORATION

Phone 0404 • "Globe 1890" • PUEBLO, COLO.

SALE PRICE  
\$195.00

## M-G SETS — ROTARIES

3 ph. 60 cy.

500 KW West. 550 v.—710 HP 2200 v. 800.  
450 KW G.E. 275 v.—2200 v. 800. 1200 RPM  
300 KW G.E. Rotary 275 v. with 3-110 KVA 2200/1000 v. Transformers and control.  
200 KW West. 275 v.—2200 v. 800. 2200/3/60.  
200 KW G.E. 275 v.—2200 v. 800. 2200/3/60.  
250 KW West. 416 220 v.—2200 v. 800. 1200 Rev.  
150 KW G.E. 275 v.—220 v. 800. 2200/3/60/1200 Rev.  
150 KW West. 125-225 HP Ind. 2200/440/220 v.  
100 KW Rldy 275 v.—150 HP Ryn. 2200 v.  
100 KW West. 125 v.—150 HP Ind. 2200/440/220 v.  
50 KW G.E. 250 v.—70 HP Ryn. 220/440 v.

## MOTORS AND GENERATORS

500 v. G.E. MT-12 2200/2/40. 450 Rev. R.R.  
250 v. HP. West. CW 2200/3/60 600 RPM S.R.  
300 HP. G.E. 1 M 2200/3/60 450 RPM S. R.  
150 HP. G.E. RT 220/440 v., 605 RPM.  
100 HP. G.E. Type 1 C 2200/3/60 600 RPM S. C.  
150 HP. G.E. 800. 220/440/3/60 600 RPM.  
150 HP. West. CW 220/440/3/60 500 RPM S. C.  
100 HP. G.E. 1M 440/220/3/60 450 RPM S. R.  
75 HP. West. RK 150, 220 v., 1150 RPM.  
80 KW West. RK 250 v., 1350 RPM Gen.  
60 HP. West. CW 220/440/3/60 1200 RPM S. C.  
20 HP. West. RK 40, 220 v., 1750 RPM.  
150 KW Triumph 250 v., 600 RPM Gen.  
150 KW G.E. 550 v., 1C 1150 RPM Gen.  
125 KW West. RK 250 v., 600 RPM Gen.  
100 KW West. RK 250 v., 600 RPM Gen.

## TRANSFORMERS

1—100 KVA All. Ch. 2200 v.—220 v.  
6—75 KVA G.E. 2200 v.—115/220 v.

PROMPT SHIPMENT ON ALL SIZES A. C. AND D. C. REBUILT MOTORS.

**MOORHEAD ELECTRICAL MACHINERY CO.**  
Pittsburgh 19, Pa. Mayflower 1-7900

## BUY NOW—IMMEDIATE DELIVERY

NEW—USED—REBUILT MACHINE TOOLS.  
Lathes, Drills, Shapers, Shears, Mills, Hammers, Air Compressors, Foundry Machinery, Machine Shop & Industrial Equipment.  
Send us your inquiry for prompt service.

## FALK MACHINERY COMPANY

15 Ward St., Rochester, N. Y. Phone Baker 5887

LOCOMOTIVES  
Haulage and Gathering

20/25 Ton G.E. 500 V. 42"/44" ga. 3HM824 G.B. Motors.

13 ton Jeff. 250 v. 44" Ga. MH11D.  
10 ton Jeff. 250 v. 50/42" Ga. MH 110 Motors.  
8 ton Goodman 250 v. 42/44" Ga. 9104C2.  
8 ton Goodman 250 v. 42/44" Ga. 9104C1.  
8 ton Jeff. 250 v. MH 88 Gash. 42" Ga.  
4 ton West. 250 v. 504 Motors 36" Ga.  
3 ton Goodman 50 v. 250 v. 42" Ga. Gash.  
2 4 ton Goodman. 250 v., 42" Ga. apl. motor, gash.

## LOADING MACHINES &amp; SHUTTLE CARS

3—14 Btl. Joy "D" V. D.C. permissibles.  
1—8 Btl. Joy 250/3/60 A.C. permissibles.  
3—5 Ton Joy Shuttle cars with wheels.  
3—5 Ton Joy Shuttle cars with batteries.

## STORAGE BATTERY LOCOMOTIVES

4 ton G.E. Permissible SB Motors, 50/44" Ga.  
5½ ton Ironton Type A 50/42 Ga.

## MINING MACHINES

5—25B Jeff. 250 V. permissibles.  
3—112E2 Goodman 250 V. permissibles.  
1—512 Goodman 50 v. A.C. 220/3/60 perm.  
1—1202 Goodman 220/3/60 open.

## HOISTS, CRANES AND PUMPS

300 HP Lidgerwood apl. 8-rod drum. 6½" dia., 3' face. 3" Ranges grooved—1½" cable. 300 HP 2200/4000/3/60 Westph. CW.

75 HP Mead Morrison apl. fr. drum—AC Motor.  
1—50/75 HP 3 drum Mead Morrison ships.  
50 HP Heyl & Patterson apl. 8-rod drum. 4" dia.



## SEARCHLIGHT SECTION

# BARGAINS FOR SALE

### LATE TYPE CUTTING MACHINES 250 VOLT DC

- 5—Goodman 212-AA Low Volt.
- 6—Bullman 10-B Low Volt.
- 1—Jeffrey 28-U Permissible Type Truck Cutters.
- 3—Joy 7-AU Permissible Type, Universal.
- 15—Goodman 512-CJ Permissible Type, Universal.
- 10—Jeffrey 35-BB Permissible Type.
- 7—Goodman 112-AA Universal.
- 6—Jeffrey 34-L Late Type Longwall.

### LATE TYPE CUTTING MACHINES 220/440 VOLT AC

- 10—Goodman 11-G3 on tip-torn trucks.
- 7—Goodman 117-G3A.
- 6—Bullman 7-B on tip-torn trucks T-6.
- 3—Goodman 512-CL3 on tip-torn trucks.

### LOCOMOTIVES, 250 VOLT DC BALL BEARING MOTORS

- 1—New 20-ton Jeffrey Tandem.
- 2—15-ton Goodman, Type 36-A04C.
- 3—15-ton General Electric, Type HMB20.
- 3—15-ton Jeffrey, Type MH110.
- 3—15-ton Westinghouse, Type 900C.
- 3—10-ton Goodman, Type 34-B.
- 3—10-ton Westinghouse, Type 907C.
- 3—10-ton General Electric, Type HMB19.
- 4—10-ton Westinghouse, Type 905C.
- 4—10-ton Goodman, Type 32A1AT.
- 6—10-ton Westinghouse, Type 904C, with new YR-6-A Cable Rosts.

The above Locomotives have been completely rebuilt. We have four General Electric HMB21, 250 volt DC, 42" gauge. Gathering Locomotives with CY-21 rods and cable, completely rebuilt and guaranteed, which we are offering at \$4,250.00 each, subject to immediate inspection and prior sale.

### BELT CONVEYORS

- 1—Joy LaDel 36" Belt Conveyor, 5,000' centers.
- 1—Joy LaDel 26" Belt Conveyor, 5,000' centers.

Belt Belts are practically new, complete with drives, head and tail rollers, idlers and all necessary appurtenances.

Many other items of equipment to offer. Mail us your inquiries. We will cash for any good equipment you have to sell. Send us your bill.

WE SPECIALIZE IN BUYING OUTRIGHT COMPLETE MINES THAT ARE GOING OUT OF BUSINESS OR FROM RECEIVERS IN BANKRUPTCY, ADMINISTRATORS OF ESTATES, ETC.

## COAL MINE EQUIPMENT SALES COMPANY

Since 1912

FRANK J. WOLFE  
LONG DISTANCE PHONE 34

SHELDON J. WOLFE  
TERRE HAUTE, INDIANA



M-G SETS—AC to DC  
300 KW Allis-Ch. DC 250 V., synch. motor 440/2200 V.  
200 KW G.E. DC 125/250 V., motor 220/440 V.  
250 KW Allis-Ch. DC 250 V., synch. motor 440 V.  
200 KW Ridgeway DC 350 V., synch. motor 440 V.  
150 KW Cr. Wh. DC 250 V., synch. motor 440 V.  
100 KW G.E. DC, 250 V., motor, 2200 V.

D.C. MOTORS—230/250 V.  
150 HP Cr. Wh. b.b. TEFC 500 RPM.  
100 HP Whse. SREIE 480/900 RPM.  
100 HP G.E. Type C 575/1150 RPM.  
50 HP G.E. COW 1,000 RPM, b.b. drip (2).  
75 HP Cr. Wh. CMO, 1150 RPM, b.b.  
75 HP Allis-Ch. C, 500 RPM, auto starter.  
50 HP G.E. CO, 125 800 RPM.  
30 HP Whse. SREIS, 1750 RPM (2).  
25 HP G.E. CDS, 1750 RPM.  
D.C. Generators—250 Volts.  
150 KW, 100 KW, 60 KW, 75 KW, 50 KW.

Complete Stock A.C. Motors—New and Rebuilt Up to 300 H.P.—84. Cops. Slip Ring, Synch.

SPECIAL—2—300 H.P. Allis-Ch. slipring motors, 720 RPM, 2,200 volts.

Gear Head Motors Speed Reducers Pumps—Blowers  
WRITE — WIRE — PHONE

**ARTHUR WAGNER CO.**  
1433 W. Randolph St. Chicago 7  
ELECTRIC MOTORS - GENERATORS

### ROTARY CONVERTER

1—300 KW G-E Rotary Converter, 3/60/440 (transformers for 2300 or 4150) 250/275 volt DC, 900 RPM; w/control.

C & S MACHINERY COMPANY  
715 Howard St. St. Louis 6, Mo.

## TRANSFORMERS FOR SALE

- 3—500 KVA A-Ch 33000 - 2300
- 3—500 KVA G-E 2400 - 240/480
- 3—500 KVA G-E 11500 - 2300/4000Y
- 3—333 KVA G-E 33000 - 2300/4000Y
- 3—333 KVA G-E 13800 - 120/240
- 3—333 KVA G-E 2400/4160Y - 240/480
- 1—250 KVA G-E 6900/11950Y - 230/460
- 3—200 KVA G-E 6900/11950Y - 230/460
- 3—200 KVA G-E 6600/11430Y - 2300
- 3—200 KVA W-H 2300 - 460/230/115
- 3—150 KVA G-E 11000 - 2300/4000Y

### 3-phase

- 2—1500 KVA GE 33000Y - 2300W/575
- 1—1800 KVA Wag 6600 - 575

Many other items in stock

## TRANSFORMERS WANTED

Reliable rewind and repair service on all makes of transformers

**THE ELECTRIC SERVICE CO.**

Cincinnati 27, Ohio

### — FOR SALE —

Two—Modern Jeffrey Aerodyne 5' Fans with motors, control equipment and tube. \$800.00 each—\$1,500.00 for both.

**BEN HUR COAL COMPANY**

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## Unusual Opportunity RUBBER CONVEYOR BELTING (Mfd. by Goodyear Tire & Rubber Co.) SLIGHTLY USED EXCELLENT CONDITION

EXTREMELY LOW PRICED

At present moment Belting can be inspected on operating Conveyors. Being removed by December 15th, 1949.

1,800 Ft. 60" x 9 Ply, 48 Oz. Duck, 14" top x 1 1/16" bottom covers.

1,700 Ft. 48" x 7 Ply, 48 Oz. Duck, 14" top x 1 1/16" bottom covers.

## Also Available BRAND NEW RUBBER CONVEYOR BELTING

GUARANTEED FIRST GRADE  
LOW PRICED

2,600 Ft. 36" x 6 Ply, 32 Oz. Duck, 3 1/16" top x 1 1/16" bottom covers.

1,000 Ft. 30" x 5 Ply, 32 Oz. Duck, 1 1/2" top x 1 1/16" bottom covers.

2,000 Ft. 24" x 5 Ply, 28 Oz. Duck, 1 1/2" top x 1 1/32" bottom covers.

2,500 Ft. 18" x 4 Ply, 28 Oz. Duck, 1 1/2" top x 1 1/32" bottom covers.

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Four Goodman Standard 50 H.P. machines. Also Two (2) 50 H.P. Universal. One 504 Westinghouse 4 ton locomotive 250 Volts. One M.B. 40 4 ton Jeffrey. One (1) G.M.C. 150 H.P. Diesel Engine 7 1/2 K.W. Generator. One (1) 80 H. Goodman 5 ton 250 Volts. 100 K.W. Q.E. 775 Voids Generator D.C.—Also 5 and 10 and 7 1/2 H.P. Motors.

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## CRUSHERS

- 1-3600 Laid Roll double roll crusher.
- 1-3624 Jeffrey Single Roll Crusher.
- 1-3624 Jeffrey Single Roll Crusher.

## HOISTS

- 1-Orion Iron Works central drum hoist, serial 23165, weight 55,000 lbs., 1 1/2" rope, complete with remote control and hydraulic brake. Direct connected to GE 300 HP motor, model 22C947, type TPC-5617, frame M 3/60/220V, 575 HP, 21% amps, 870 secondary amps, complete with automatic switchboard.
- 1-Orion Iron Works, single rigid cylinder-central drum hoist, serial 24896, weight 45,000 lbs., 1 1/2" rope, complete with remote control and hydraulic brake direct connected to Western Electric 180 HP motor, model 17815, type MT-564-19-150-730, form B, 3 phase, 60 cycle, 440 volts, slip ring, secondary volts 285, amps, 187, secondary amps, 189, speed full load 760, serial 24563313, continuous 49° C. Complete with controller and resistance.
- 1-Orion Iron Works, drum diameter 48", face 80", face grooved for 1" rope, equipped with post brake 94" diameter, hand operated, single reduction counter gears, 18 teeth and 159 teeth, 1 1/2" pitch, 18" face, drum shaft 7" diameter, drum shaft bearing 7" x 14", pinion shaft bearing 4 1/2" x 11 1/2" of the ring oiling type.

## LOCOMOTIVES

- 1-12 ton Goodman ball bearing locomotive, 42" gauge, type 258-O-4-Z.
- 4-8 ton Goodman ball-bearing locomotives, 36" gauge, type 22AOT.
- 1-8 ton Goodman ball bearing locomotive, 42" gauge, type 22-AO-4T.
- 1-8 ton Westinghouse locomotive, 36" gauge, Class 4-3-35-C-487.
- 1-6 ton Jeffrey locomotive, 42" gauge.
- 6-6 ton GE ball bearing locomotives, 42" gauge, class EM20CM11 with HEM21-A motors.
- 1-4 ton Whitcomb Battery locomotive, 36" gauge.
- 2-4 ton Goodman ball bearing locomotives, 36" gauge, type 22-1-1-2, (with or without gathering rails).

## REBUILT MINING MACHINES

- 3-112 A.A. Goodman Universal D.C.
- 4-112 G.J.A. Goodman Universal 220 Volts A.C.
- 3-112 G.J. Goodman Universal 220 Volts A.C.
- 4-50 H.P. Goodman Standards 220 V. A.C.
- 4-358 Jeffries Machines 250 Volts D.C.
- 1-358 Jeffries Machines 220 Volts A.C.
- 4-CE7 Sullivan Machines A.C. and D.C.
- 2-78 Sullivan Machines 250 Volts D.C.

## LOCOMOTIVES

- 4-4 Ton G.E. Ball Bearing 42 inch Gauge
- 1-5 Ton Maucha Storage Battery Motor 42 inch Gauge
- 2-4 Ton Westinghouse Ball Bearing
- 4-Drill Trucks on Rubber 220 Volts A.C.
- 3-Goodman Caterpillar Trucks 220 Volts A.C.
- 1-Electric Hoist 4 pt. Drum 150 H.P. Motor 2300 Volts
- 1-200 K.W. M.G. Set 1200 R.P.M. Complete with Switchboard
- 1-300 K.W. M.G. Set 1200 R.P.M. Complete with Switchboard, Both are G.E.
- 4-8 BU Joys 36 and 42 inch Gauge on C.A. and D.C.
- 4-5 BU Joys 42 inch Gauge on C.A. and D.C.
- 2-2 Lea Horse Six Ton Kool-Mobiles Model K.M.C. 462

## THOMAS GILLESPIE

State Road 67 Bicknell, Ind.

## MINING MACHINES

- 4-CL25 AC, 3 phase, 60 cycle, 220 volt, Sullivan longwall mining machine
- 1-Goodman Universal Mining Machine, 112AA, DC, 4 1/2" cutter bar.
- 1-Jeffrey Shortwall Mining Machine, 35 BU, AC, 4" cutter bar complete with tip turn truck, cable and reel.
- 1-Sullivan Shearing Machine, Class CH11, DC, 8" motor bar.
- 2-Sullivan Longwall Mining Machine, type CH3, 3/40/220 volts, 50" cutter bars.
- 1-Sullivan shearing machine, class CH 11 AC.
- 1-12AA Goodman mining machine, 50 HP, 42" gauge.
- 2-Goodman Universal mining machine, 50 HP 3/60/220 volts, 42" gauge.

## MOTOR GENERATOR SETS

- 1-50 KW GE motor generator set type CD 153, form A, comp. wound, 337 amps, 250 volts no load, 275 volts full load, 1200 RPM, cont. 50 deg. cent., 21520004 direct connected to 125 HP GE dyn. motor type TR, form PK, frame T354, 3/60/2200 volts, 1200 RPM, 37.6 amps, cont. 40 deg. cent., Excitation 250 volts, 8.8 amps, .74 PF, 24314971, complete with switchboard.
- 2-200 KW Hildeway dyn. motor generator sets, 2500 volts AC, 1200 RPM, 250-275 volts DC, complete with switchboard, one has brand new GE automatic circuit breaker.
- 20 GE General Electric motor generator set, 350004, type BB, form C, I.S. 350070-30, 250 amps, 250 volts, 1740 RPM, cont. 50° C. direct connected to 75 HP General Electric induction motor, type KT337-4-75-1800 Form B, 3 phase, 60 cycle, 230 volts, 174 amps, 1.730 rpm, 24322053, cont. 49° C, complete with manual switchboard and compensator.

## RAILS

Trucked and car lots of good second hand 18, 20 and 25 lb. rails.  
Carload lots new 12 lb., 16 lb., 20 lb., 25 lb. and 30 lb. rails. Price and delivery information upon request.

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- 1-200 KW Westinghouse Rotary Converter complete with transformers and switchboards.

## ELECTRIC DRILLS

- 1-Little Giant, AC electric coal drill size 473, 3 phase, 60 cycle, 220 volts, type 177, serial 2145829.
- 2-Duster Electric drills, AC, 220 volts, new type.

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Several hundred feet used 500,000 CM Weatherproof stranded copper.  
Several hundred feet used 500,000 CM Bare stranded copper.  
Several thousand feet used 4/0 Figure 8 trolley wire.  
Several thousand feet 1,000,000 CM lead covered copper.  
1,388 feet 1/2" 8/0 conductor rubber covered cable—used.  
Several thousand feet of used 4/0 Figure 8 trolley wire.  
Several thousand feet used 3 Conductor No. 2300 volt cable.  
Several thousand feet used 300,000 CM Cable.

## TIMBLE

- 1-Steel timble complete with shaker and concrete silos. Capacity 1,000 tons per day.

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- 11-512 AC Goodman Mining Machine, 3/60/220, 5 1/2 ft. cutter bar.

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- 12-4200 Goodman Duckbills Complete, AC.
- 2-4200 Goodman duckbills, DC.

We are distributors for John A. Reubling's Sons Company wire rope and fittings.

# GAVENDA BROTHERS, Inc.

CANTON, ILLINOIS

## MOTOR GENERATORS

- 1-500 KW G.E. Syn. 275 V. 900 RPM
- 1-500 KW G.E. Syn. 575 V. 900 RPM
- 1-400 KW WEST. Syn. 575 V. 720 RPM
- 1-300 KW G.E. Syn. 275 V. 1200 RPM
- 1-200 KW G.E. Syn. 275 V. 1200 RPM
- 1-150 KW G.E. Syn. 275 V. 1200 RPM

## GENERATOR ARMATURES

- 1-500 KW G.E. 275 V. MFC, Form L 900 RPM
- 1-500 KW G.E. 575 V. MCF, Form H 900 RPM

## ROTARY CONVERTERS

- 1-500 KW WEST. Syn 275 V. 1200 RPM
- 1-300 KW G.E. Syn. 275 V. MCC 1200 RPM
- 1-300 KW G.E. Syn. 575 V. MCC 1200 RPM

## CONVERTER ARMATURE

- 1-300 KW G.E. 575 V. MCC, Form F 1700 RPM

## LOCOMOTIVES

- 2-30 T JEFFREY 250 V. MH-77 48-34" Ga.
- 1-20 T JEFFREY 250 V. MH-77 48-34" Ga.
- 3-13 T JEFFREY 250 V. MH-2110 42-32" Ga.
- 1-13 T G.E. 250 V. MH-827 44-34" Ga.
- 1-10 T JEFFREY 250 V. MH-110 44-32" Ga.
- 1-8 T WEST. 250 V. ML-904-C 44-34" Ga.

## LOCOMOTIVE MOTORS

- 2-G.E. 500 V. MH-820-A, Ball Bearing
- 2-WEST. 250 V. ML-908-C, Ball Bearing
- 2-WEST. 250 V. ML-907-C, B.B. (New)
- 2-WEST. 250 V. ML-906-C, Ball Bearing
- 2-WEST. 250 V. ML-904-R, B.B. (New)
- 1-WEST. 250 V. ML-901-C, Ball Bearing
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Extra Armatures Available for Above Motors.

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PITTSBURGH 19, PENNSYLVANIA

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COMPLETE ELEVATORS • DRAG CONVEYORS • PAN & RECIPROCATING FEEDERS

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IMMEDIATE DELIVERY

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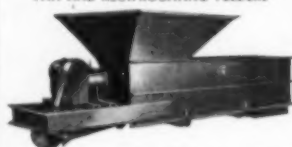
### MINE TIPPERS AND TRUCK SCALES

15 Ton Truck Scales	\$450.00
20 Ton Truck Scales	\$10.00
25 Ton Truck Scales	\$44.00
Other scales to 50 ton capacity. All truck scales complete with structural steel weighbridges. Replacement parts for most all makes of scales.	
5 Ton Tippler Scales	\$312.00
15 Ton Tippler Scales	480.00
25 Ton Tippler Scales	445.00

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10 to 20 tons per hour capacity	\$395.00
20 to 40 tons per hour capacity	785.00
40 to 60 tons per hour capacity	1785.00
60 to 100 tons per hour capacity	2295.00

### PAN AND RECIPROCATING FEEDERS



15 to 35 tons per hour capacity	\$150.00
20 to 40 tons per hour capacity	190.00
50 to 100 tons per hour capacity	575.00
100 to 175 tons per hour capacity	800.00

### VIBRATING SCREENS

Approximately 180 machines in stock, ranging in screen sizes from 2'x5' to 5'x14' and with 1 to 5 decks. Eccentric weight or positive throw eccentric shaft types.

Prices from ..... \$395.00

### CONVEYORS—PICKING TABLES



Troughing idler conveyors—picking tables. Lengths from 10' to 500', widths to 40".

Prices from ..... \$395.00

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All steel. Interchangeable with other well-known makes of idlers. Precision ball bearings with aluminum fittings. Replaceable bearings. Shafts run clear through, and no bearing adjustments are required. Easy to start and will run in cold weather. Rust-proof ball races; maintenance is negligible. Build your own conveyors. We have all parts, including standard sections, head and tail pulleys, take-ups, drives, idlers, speed reducers, sheaves, belting, etc.

3-roll Troughing Idlers:		
14" belt width	\$18.50	24" belt \$21.00
16" belt	19.80	36" belt 22.00
18" belt	20.80	36" belt 23.00
		42" belt 24.80
1-roll Return Idlers:		
24" belt width	\$8.25	36" belt \$9.75
30" belt	9.00	42" belt 10.50
		48" belt 11.25

More than 2000 mines have bonded equipment.

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H.P.	Make	Type	Speed
125	G. E.	BC-15	1750
100	G. E.	BC-14	1750
100	Al. Ch.		1150
20/45	G. E.	RP-17	650/475
75	Sprague		1000/1500
75	West. (3)	SK-180	475
75	Cy. Wh.	LT	490/470
75	Cy. Wh.	CMC	275/950
60	West. (3)	SK-160	680
50	G. E.	BC-12	1750
50	Idler		250/1050
45/90	G. E.	RP-17	475/1050
25/75	Cy. Wh.	CCM	165/500
50	West. (3)	SK-160	865
50	G. E.	RP-17	250/1000
50	West.	SK-160	200/1000
40	Century	DN-654	1740
40	G. E.	BC-31	1700
40	G. E.	BC-32	1700
40	G. E.	BC-31	750
40	G. E. (2)	CD-1441	400/1500
40	Cy. Wh.	CCM	700
40	Rel.	661T	400/1200
25	West.	SK-120	1150
35	G. E.	BC	450/1000
30	G. E. (8)	CDM 05	2500
30	West.	SK	975
30	Cent.	D-100	850
30	G. E.	BC-33	775
30	West.	SK-143	800/1500
30	West. (2)	SK-143	975

Complete Stock AC and DC Equipment.

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## FOR SALE

- 225 HP Busch Sulzer 150 KW diesel engine generator set.
- 30 ton American steel stiffleg derrick. 100 foot boom.
- 100 ton Baldwin diesel electric switching locomotive.
- 35 ton Ohio locomotive crane. Gas powered. Built 1943.
- 150 HP portable firebox boiler. ASME Code. 250# steam pressure.

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- 150 KW — GE
- 200 KW — GE
- 500 KW — West.

250 or 275 volts DC, 1200 rpm., pedestal type. With transformers (wound to requirements) and AC and DC switchboards.

Also NEW motors at a big discount.

Your inquiries solicited.

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## NEW WIRE ROPE FOR SALE

6 X 19 IWRC & HEMP CENTERS  
1/4" dia. IMPROVED PLOW STEEL, 4x19, PRE-FORMED, IND. WIRE ROPE CENTER; 10 reels — 2000 ft. each reel.  
1/2" dia. 4x19, IWRC, 1000 ft. reels (20 REELS).  
1/2" dia. 4x19 IWRC, 3045—220—200—154' EA. REEL.  
HEMP CENTER ROPES IN ALL SIZES from 3/8" to 1 3/4" diameter. 6 x 19. CONVEYOR BELTING; PROOF COIL CHAIN; Y&T CHAIN HOISTS; WIRE ROPE CLIPS.

PRICES WAY BELOW COST. IMMEDIATE SHIPMENT. SEND FOR LIST.

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MOTORS • GENERATORS • TRANSFORMERS

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Belt, Bucket, Drag or Gravity  
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LEFTON INDUSTRIAL CORP.  
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## 100 KW. Diesel Engine Generator Sets

11—100 kw., 250/275 V. D.C. Delco Generators dir. con. to 150 HP. GBD-8, 5½ in. x 7, 8 cyl. Superior DIESEL Engines. Elec. starting, power panels and accessories.

2—100 kw., same as above with 220/400 V. New A.C. Generators.

2—35 kw., 250 V. D.C. NEW GAS or GASOLINE Engine Generator Sets.

4—37½ kva. 220/440 V. 3 ph. 60 cy. NEW Gas or GASOLINE, also Diesel Engine Generator Sets.

11—3 kva. 120/230 V. 1 or 3 ph. dir. con. Hercules GASOLINE.

## MINING MACHINE

1—35 B Jeffrey 250 volt D.C., 36" ga.

## STOCK SHIPMENT

MOTOR GENERATOR SETS—50 to 200 kw.

D.C. Generators, 75, 100, 150 and 200 kw. A.C. and D.C. Motors, all sizes 1 to 500 HP.

## HOIST CONTROLLERS

2—400 HP 2300v. 3 ph. 60cy. Westinghouse for use with slip ring motors. Complete with grid resistance for hoist duty.

TRANSFORMERS, WINCHES, HOISTS, CAR PULLERS, ROOM HOISTS, PUMPS, BRAND NEW CONTROL.

Write for New Catalog.

**DUQUESNE ELECTRIC & MFG. CO.**

PITTSBURGH 6, PA.

AVAILABLE 'NOW'  
USED D.C. MOTORS

7½ h.p. G.E. 200 v. 450/1200 r.p.m.  
7½ h.p. G.E. 1 v. 450/1200 r.p.m.  
7½ h.p. G.E. 230 v. 450/1200 r.p.m.  
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1 h.p. G.E. 230 v. 450/1200 r.p.m.  
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AVAILABLE FOR IMMEDIATE SHIPMENT  
ALL MOTORS TESTED AND "IN STOCK"

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COAL MINE EQUIPMENT  
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## FOR SALE

Burgess-Erie 200-B electric shovel, mounted on caterpillars; 10 cu. yd. bucket; shovel in excellent condition; has been used loading coal in strip mine. Reason for sale, we have installed 17 cu. yd. Burgess-Erie 850-B. Specifications and photographs sent on request.

NORTHWESTERN IMPROVEMENT COMPANY  
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TRANSMISSION BELT-  
ING. ELEVATOR BELT-  
ING. FIRE, WATER, AIR  
STEAM, SUCTION and  
WELDING HOSE.

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DUCTS ARE NEW, GUAR-  
ANTEED & LOW PRICES

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## ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers	Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"	24"	4	1/8"	1/32"
42"	5	1/8"	1/16"	20"	5	1/8"	1/32"
36"	6	1/8"	1/16"	20"	4	1/8"	1/32"
30"	6	1/8"	1/16"	18"	4	1/8"	1/32"
30"	5	1/8"	1/16"	16"	4	1/8"	1/32"
26"	5	1/8"	1/32"	14"	4	1/16"	1/32"
24"	5	1/8"	1/32"	12"	4	1/16"	1/32"

Inquire For Prices — Mention Size and Lengths

## TRANSMISSION BELTING

## HEAVY-DUTY FRICTION SURFACE

In.	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire  
For Prices  
as — Men-  
tion Size and  
Lengths.

## ENDLESS "V" BELTS

"A" Width All Sizes —  
"B" Width All Sizes —  
"C" Width All Sizes —  
"D" Width All Sizes —  
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Sold in Matched Sets.  
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## SPECIAL OFFER . . . HEAVY DUTY RUBBER HOSE

## FIRE HOSE

APPROVED SPECIFICATION HOSE EACH  
LENGTH WITH COUPLINGS ATTACHED

I.D. Size	Length	Per Length
2½"	50 feet	\$28.00
2"	25 "	16.00
2"	50 "	23.00
1½"	25 "	13.00
1½"	50 "	20.00
1½"	25 "	11.00

Specify Thread On Couplings

## AIR HOSE

I.D. Size Length per Length Universal Couplings

½"	25 feet	\$5.00	\$1.50 Pair
½"	50 "	10.00	1.50 Pair
¾"	25 "	7.50	1.50 Pair
¾"	50 "	15.00	1.50 Pair
1"	25 "	10.00	1.50 Pair
1"	50 "	20.00	1.50 Pair

LARGER SIZES ALSO AVAILABLE  
All Prices—Net — F.O.B. New York

## WATER HOSE

I.D. Size	Length	per Length	I.D. Size	Length	per Length
¾"	25 feet	\$4.25	1"	35 feet	\$10.50
¾"	50 "	8.00	1"	40 "	12.00
1"	25 "	6.25	1"	50 "	15.00
1"	50 "	12.50	1½"	25 "	10.00
1½"	25 "	7.50	1½"	35 "	14.00
			1½"	50 "	20.00

Each Length with Couplings Attached

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Converters, Motor Generator Sets, A.C. and D.C. Motors,  
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150 HP, 900 RPM, Elec. Mech., 220/3/00 Sys.  
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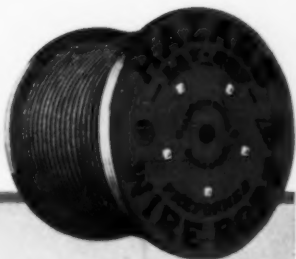
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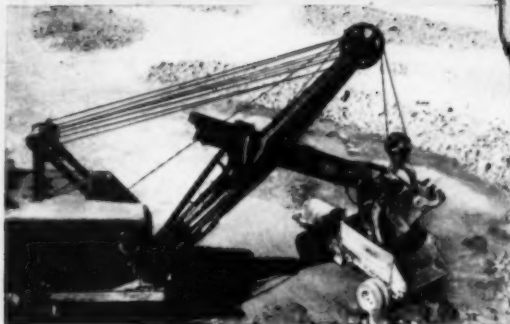


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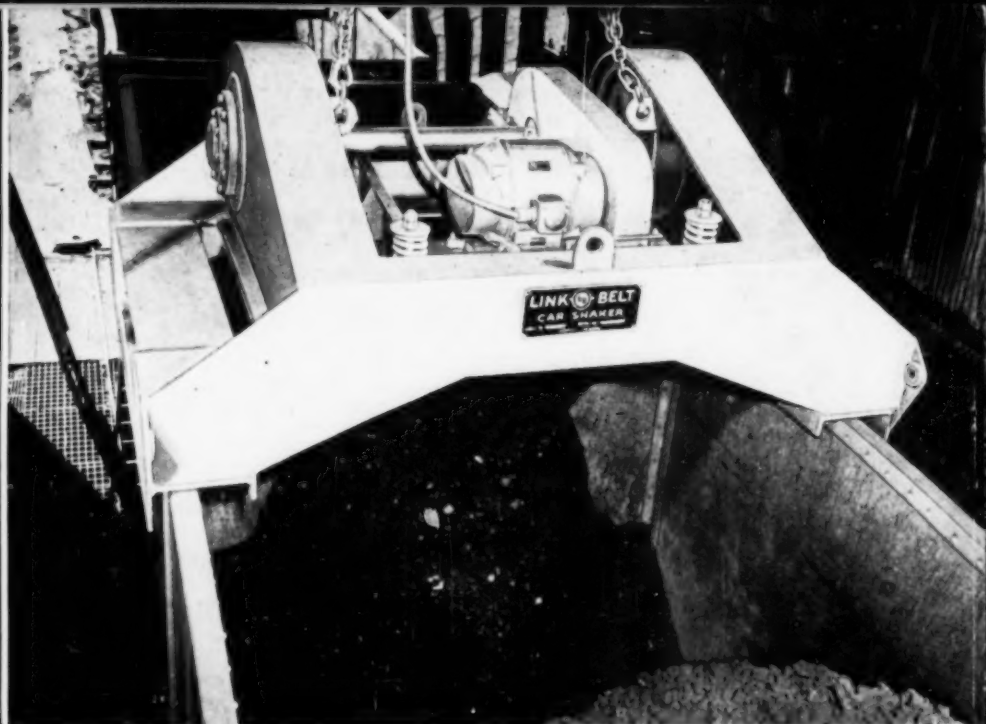


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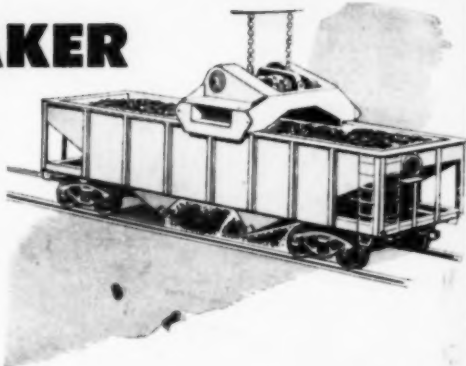




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